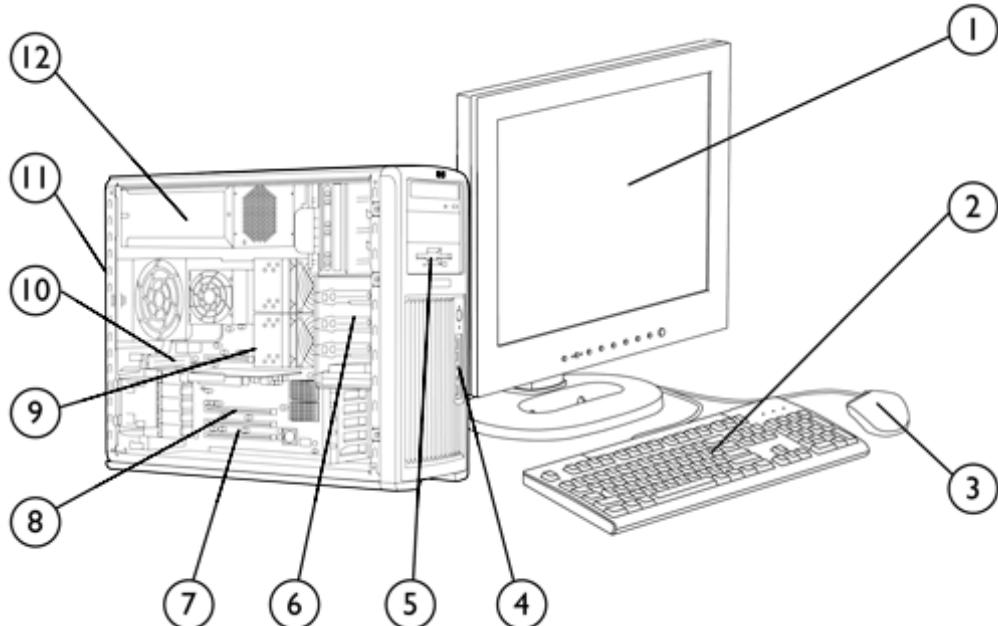


### Overview

HP recommends Windows Vista® Business



- 1. Monitor (sold separately)
- 2. Standard Keyboard (USB or PS/2)
- 3. Mouse (USB or PS/2)
- 4. Front I/O: 2 USB 2.0, IEEE-1394 (standard), headphone and microphone
- 5. 5.25" external bay for optional diskette drive, optical drive or additional 5.25"/3.5" device
- 6. 5 internal 3.5" bays, 3 external 5.25" bays
- 7. 1 PCI, 2 PCI-X slots, 2 PCI Express x8 slots
- 8. 2 PCI Express x16 Graphics slots
- 9. Dual-Core AMD Opteron™ Processors 2000 series
- 10. 8 DIMM slots for DDR2 memory
- 11. 6 USB 2.0, 1 standard serial port, 1 IEEE 1394, 2 PS/2, 2 RJ-45, SPDIF out, audio in/out, microphone
- 12. 800 watt power supply

### Overview

#### At A Glance

- Up to two Dual-Core AMD Opteron 2000 series processors with 1 GHz HyperTransport™ bus interconnects. Liquid or air-cooled options.
- Choice of Operating Systems Preloaded:
  - Genuine Windows® Vista™ Business 32 or 64
  - Genuine Microsoft Windows Vista™ Business 64-bit downgrade to Microsoft Windows XP Professional x64
  - Genuine Microsoft Windows Vista™ Business 32-bit downgrade to Microsoft Windows XP Professional
  - Genuine Windows XP Professional
  - Genuine Windows XP Professional x64 Edition
  - Red Hat Enterprise Linux® WS 4 (Update 4 or later) (32- or 64-bit version)
  - HP Linux Installer Kit (see [www.hp.com/workstations/software/linux](http://www.hp.com/workstations/software/linux)):
    - Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)
    - Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version)
    - For detailed OS/hardware support information for Linux, see: [www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)
- Up to 64 GB of DDR memory, with dual CPUs and 8 GB DIMMs, using integrated CPU memory controllers
- Dual PCI Express x16 graphics slots
- Support for NVIDIA Scalable Link Interface to link dual graphics cards
- Dual integrated NVIDIA Gigabit ethernet
- Six channel SATA 3 Gb/s and 8 channel SAS controller, with factory-configured RAID (Factory integrated RAID is Microsoft Windows only)
- Integrated HD audio with internal speaker
- Pre-loaded Manageability tools (Microsoft Windows only)
- Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

### Standard Features - Custom Components

**Processor and Speed –** One or two of the following

Dual-Core AMD Opteron Processor 2000 series with 1 GHz HyperTransport™ Technology bus, 1 MB L2 cache per core, optional liquid cooling available.

AMD Opteron Processor Model 2212/ 2.00 GHz  
AMD Opteron Processor Model 2214/ 2.20 GHz  
AMD Opteron Processor Model 2216/ 2.40 GHz  
AMD Opteron Processor Model 2218/ 2.60 GHz  
AMD Opteron Processor Model 2220/ 2.80 GHz  
AMD Opteron Processor Model 2222/ 3.0 GHz  
AMD Opteron Processor Model 2224SE/ 3.20 GHz

**NOTE:** Dual Core is a new technology designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefit; check with software provider to determine suitability. Not all customers or software applications will necessarily benefit from use of this technology.

**Operating System –** One of the following

Genuine Windows Vista Business 64\*  
Genuine Windows Vista Business 32\*  
Genuine Microsoft Windows Vista™ Business 64-bit downgrade to Microsoft Windows XP Professional x64  
Genuine Microsoft Windows Vista™ Business 32-bit downgrade to Microsoft Windows XP Professional  
Genuine Windows XP Professional SP2  
Genuine Windows XP Professional x64 Edition  
(See <http://www.hp.com/workstations/pws/windowsxp64/>)

\* The following components are not yet supported on Microsoft Vista Business and HP Workstations; ATI graphics, 1394b cards, dual graphics configurations, Scalable Link Interface (SLI) used on NVIDIA graphics cards, Creative SoundBlaster X-Fi, RAID 5 10 or data array

Red Hat Enterprise Linux WS 4 (32-bit/64-bit)

**NOTE:** The RHEL3 U4 (x86) OS will operate correctly with most options after some manual configuration steps. Please refer to the Release Notes Chapter in [http://www.hp.com/support/linux\\_user\\_manual](http://www.hp.com/support/linux_user_manual).

HP Installer CD for Red Hat Enterprise Linux WS 4

See <http://www.hp.com/workstations/software/linux>

Click on "Hardware support matrix" under "Related links" for details.

**NOTE:** An AMD64-enabled workstation should provide leading performance for many 32-bit applications. Although not all 32-bit applications may run as normal when you decide to change to a 64-bit operating system, many will, providing excellent flexibility. It is advised to pre-test your applications by visiting Microsoft's 64-bit 120-day free trial (<http://www.microsoft.com/windowsxp/64bit/evaluation/trial.mspx>) before you switch to a 64-bit processor with a 64-bit operating system. AMD64 requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for a 64-bit processor. Processor will not operate (including 32-bit operation) without a 64-bit enabled BIOS. Performance will vary depending on your hardware and software configurations.

### Standard Features - Custom Components

Power Supply Cord*	Specially rated cord supplied			
	* Use only Power Supply Cord supplied with the HP xw9400 workstation. This is a specially rated power cord.			

1-5 Hard Disk Drives	SATA Hard Drive	Windows Vista	Windows XP	Red Hat Linux
Up to 5 SATA drives, or 5 SAS drives	80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	250 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	500 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	750 GB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	1 TB 7,200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	80 GB 10K rpm SATA 1.5Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 10K rpm SATA 1.5Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	* NCQ (Native Command Queuing) not supported in Red Hat Enterprise Linux			
	Serial Attached SCSI (SAS) Hard Drives			
	146 GB 10K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	300 GB 10K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	73 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	146 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	300 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

Drive controllers		Windows Vista	Windows XP	Red Hat Linux
	Integrated Serial ATA 3 Gb/s controller (6 channels). With RAID 0, RAID 1, RAID 10, RAID 5 capability		32-Bit, 64-Bit	WS 3 & WS 4- no hardware RAID
	Integrated 8 channel SAS controller, With RAID 0 (IS*), RAID 1(IM**), RAID 10(IME***) capability	32-Bit, 64-Bit, RAID 0,1 supported and factory integrated. SAS drives only.	32-Bit, 64-Bit	WS3 & WS4- no hardware RAID
	LSI RAID Definitions: * IS: Striping of 2 or more HDDs into a single logical volume **IM: Mirroring of 2 HDDs into a single logical volume ***IME: Mirroring of 3 or more HDDs into a single logical volume			
	NOTE: Hardware Controller supported by Linux except for any of the RAID features. For customers requiring RAID functionality, consider using Software RAID functionality that is controller independent and provided within Red Hat Enterprise Linux.			

### Standard Features - Custom Components

#### Factory Integrated RAID

HP RAID 0 (Striped Array) Configuration – 750 GB HD Drive not supported. 3rd HD Drive can not be 500 GB.

HP RAID 0 Data Array Configuration – 4th HD Drive can't be 750 GB. 5th HD Drive can't be 500 GB

HP RAID 1 (Mirrored Array) Configuration – 2 HD Drives only

**NOTE:** RAID 0, 1 requires 2 identical hard drives (speeds, capacity, interface); SATA RAID 0, 1 and SAS RAID 0, 1 available as options. Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit

<http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf> for RAID capabilities with Linux.

#### Memory –

One of the following

PC2-5300 (DDR2-667 MHz) Memory DIMMs

#### SINGLE PROCESSOR Configurations

HP 1 GB (2x512) PC2-5300P DDR2-667 ECC Registered SingProc

HP 2 GB (2x1 GB) PC2-5300P DDR2-667 ECC Registered SingProc

HP 4 GB (2x2 GB) PC2-5300P DDR2-667 ECC Registered SingProc

HP 4 GB (4x1 GB) PC2-5300P DDR2-667 ECC Registered SingProc

#### DUAL PROCESSOR CONFIGS REQUIRED

HP 2 GB (4x512 MB) PC2-5300P DDR2-667 ECC Registered

HP 4 GB (4x1 GB) PC2-5300P DDR2-667 ECC Registered

HP 6 GB (4x1 GB+4x512) PC2-5300P DDR2-667 ECC Registered

HP 8 GB (8x1 GB) PC2-5300P DDR2-667 ECC Registered

HP 8 GB (4x2 GB) PC2-5300P DDR2-667 ECC Registered

HP 12 GB (4x2+4x1) PC2-5300P DDR2-667 ECC Registered

HP 16 GB (4x4 GB) PC2-5300P DDR2-667 ECC Registered

HP 16 GB (8x2 GB) PC2-5300P DDR2-667 ECC Registered

HP 32 GB (8x4 GB) PC2-5300P DDR2-667 ECC Registered

#### Windows Vista

32-Bit, 64-Bit

#### Windows XP

32-Bit, 64-Bit

#### Red Hat Linux

Not supported

#### Not supported

32-Bit, 64-Bit

Not supported

#### 32-Bit, 64-Bit

32-Bit, 64-Bit

Not supported

### Standard Features - Custom Components

HP 64 GB \* (8x8GB) PC2-4200P DDR2-533 ECC 32-Bit, 64-Bit 32-Bit, 64-Bit WS 3, WS 4  
Registered

\* Not supported with two FX4600 graphics plus 120W processor (processors with SE suffix) and fifth hard drive. PCI cards not allowed.

Removable Storage (Up to 2 of the following drives)	Windows Vista	Windows XP	Red Hat Linux
HP No Floppy Drive Option	N/A	N/A	N/A
1.44 MB Diskette Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
HP No Optical Drive Option	N/A	N/A	N/A
16X/40X DVD-ROM Drive		32-Bit, 64-Bit	WS 3, WS 4
SATA 16X/48X DVD-ROM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
SATA 48X CD-RW/DVD-ROM Combo Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
SATA SuperMulti DVD+/-RW LightScribe** Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
* LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players			

Input Devices	Windows Vista	Windows XP	Red Hat Linux
<b>Keyboard</b> - One of the following*			
PS/2 Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
USB Standard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
<b>Mouse</b> - One of the following*			
PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
USB 3-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
USB 3-Button 2.9M Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
* Mixing PS/2 and USB Keyboards and Mice are not supported with Linux OS.			

Audio	Windows Vista	Windows XP	Red Hat Linux
Integrated HD sound with internal speaker	32-Bit, 64-Bit	32-Bit	
Sound Blaster X-Fi XtremeMusic Audio Card	Not supported	32-Bit, 64-Bit	
HP Optical Drive Internal Audio Cable	32-Bit, 64-Bit	32-Bit, 64-Bit	

NIC (Network Interface Controller)	Windows Vista	Windows XP	Red Hat Linux
Integrated dual NVIDIA 10/100/1000 LAN	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
Broadcom 5751 Netxtreme Gigabit LAN (PCI Express)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4

### Standard Features - Custom Components

Graphics		Windows Vista	Windows XP	Red Hat Linux
	NVIDIA Quadro NVS 285* PCIe (128 MB, VGA & DVI)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro NVS 290 PCIe (256 MB) *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
	NVIDIA Quadro FX 560* PCIe (128 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 570 PCIe (256 MB)*	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
	NVIDIA Quadro FX 1500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 1700 PCIe (512 MB) *	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 4
	NVIDIA Quadro FX 3500* PCIe (256 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 3700* PCIe (512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 4500* PCIe (512 MB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 4600* PCIe (768 MB) – Not supported with 120W processors	Not supported	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 5500* PCIe (1 GB)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX5600 PCIe (1.5GB)	Not supported	32-Bit, 64-Bit	WS 3, WS 4

\* May use two graphics cards. Must use matching graphics cards and order a second processor. SLI and dual configurations are not supported for Microsoft Windows Vista.

Graphics Connectors		Windows Vista	Windows XP	Red Hat Linux
	NVIDIA SLI Graphics Connector *	Not supported	32-Bit, 64-Bit	
* Only supported on NVIDIA Quadro FX 3500, 3700, 4500, 4600, 5500 and 5600 and newer series graphics cards.				

Miscellaneous		Windows Vista	Windows XP	Red Hat Linux
	IEEE 1394b FireWire 800 3-Port PCI Card (1-port 1394a & 2-ports 1394b)	Not supported	32-Bit, 64-Bit	Not Supported
	Hood intrusion sensor	Yes	32-Bit, 64-Bit	N/A
	SCSI U320 Back Panel Connect	Yes		
	HP xw84/94 SAS Back Panel Connector Kit	Yes		
	HP Workstation Mouse Pad	N/A	N/A	N/A

Software		Windows Vista	Windows XP	Red Hat Linux
	Symantec AntiVirus 10 (optional preinstall)	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	Optional Microsoft Office 2007 Trial Edition	32-Bit (English language only)	32-Bit	N/A
	Optional Microsoft Office 2007 Small Business Edition	32-Bit (English language only)	32-Bit	N/A
	PDF Complete	32-Bit, 64-Bit	32-Bit, 64-Bit	N/A
	HP Performance Tuning Framework	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	HP Client Manager Software v6.0	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported
	Optional HP Protect Tools Security Solutions	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported

### After-Market Options

Processors	2nd Dual-Core AMD Opteron processor with AMD64 Technology and 1.00 GHz HyperTransport™ Technology	Part Number
	AMD Opteron Processor Model 2220/ 2.80 GHz	RC403AA
	AMD Opteron Processor Model 2212/ 2.00 GHz	EW295AA
	AMD Opteron Processor Model 2214/ 2.20 GHz	EW296AA
	AMD Opteron Processor Model 2216/ 2.40 GHz	EW297AA
	AMD Opteron Processor Model 2218/ 2.60 GHz	EW298AA
	AMD Opteron Processor Model 2222/ 3.00 GHz	RM697AA
	AMD Opteron Processor Model 2220SE/ 2.80 GHz	RM696AA
Graphics	Multi display solutions	Part Number
	NVIDIA Quadro NVS 285* PCIe (128 MB, VGA & DVI)	RD069AA
	NVIDIA Quadro NVS 290* PCIe (256 MB)	GN502AA
	NVIDIA Quadro FX 560* PCIe (128 MB)	ES354AA
	NVIDIA Quadro FX 570* PCIe (256 MB)	GR521AA
	NVIDIA Quadro FX 1500* PCIe (256 MB)	ES355AA
	NVIDIA Quadro FX 1700* PCIe (512 MB)	GP529AA
	NVIDIA Quadro FX 3500* PCIe (256 MB)	ES357AA
	NVIDIA Quadro FX 3700* PCIe (512 MB)	KD506AA
	NVIDIA Quadro FX 4600* PCIe (768 MB)	RV706AA
	NVIDIA Quadro FX 5500* PCIe (1 GB)	RF089AA
	NVIDIA Quadro FX5600 PCIe (1.5GB)	GU095AA

**NOTE:** To run the accelerated graphics driver on RHEL3 U4, download the latest driver. Please refer to the Release Notes Chapter in [http://www.hp.com/support/linux\\_user\\_manual](http://www.hp.com/support/linux_user_manual).

\*May use two graphics cards. Must use matching graphics cards and order a second processor.

### After-Market Options

Hard Drives	SATA Hard Drives	Windows Vista	Windows XP	Red Hat Linux	Part Number
	80 GB 7200 rpm SATA 3.0Gb/s Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PY276AA
	160 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PV944A
	250 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA788AA
	500 GB 7200 rpm SATA 3.0Gb/s NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	PV943A
	80 GB 10K rpm SATA NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM172AA
	160 GB 10K rpm SATA NCQ Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW222AA
	<b>SAS Hard Drives</b>				
	146 GB 10K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM173AA
	300GB 10K RPM SAS	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	RH937AA
	73 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA329AA
	146 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EA330AA
	300 GB 15K rpm SAS Hard Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM174AA
	HP xw84/94 SAS Back Panel Connector Kit	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EM164AA

**NOTE:** The RHEL3 U4 (x86) OS will operate correctly after some manual configuration steps. Please refer to the Release Notes Chapter in [http://www.hp.com/support/linux\\_user\\_manual](http://www.hp.com/support/linux_user_manual).

Controller cards	Windows Vista	Windows XP	Red Hat Linux	Part Number
LSI 8344ELP 8-port SAS HW RAID Card	32-Bit, 64-Bit	Not supported		EX830AA
IEEE 1394b FireWire 800 4-Port PCI Card (2 Ports 1394b & 1 Port 1394a)	Not supported	32-Bit, 64-Bit	Not supported	EA327AA

### After-Market Options

Input/Output Devices	Keyboards	Windows Vista	Windows XP	Red Hat Linux	Part Number
	HP PS/2 Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DT527A
	HP USB Standard Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DT528A
	HP USB Smartcard Keyboard	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	ED707AA
	<b>Pointing Devices</b>				
	HP PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DD440B
	HP PS/2 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EY703AA
	HP USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DC172B
	HP USB 3-button Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	DY651A
	HP USB 3-Button 2.9M OEM Mouse (optical)	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	ET424AA
	HP SpacePilot 3D USB Intelligent Controller	32-Bit, 64-Bit	32-Bit, 64-Bit	Not supported	EF390AA
Networking	NICs	Windows Vista	Windows XP	Red Hat Linux	Part Number
	Broadcom 5751 Netxtreme Gigabit PCIe Adapter	32-Bit, 64-Bit	32-Bit	WS 3, WS 4	EA833AA
	Intel Pro 1000 GT Gigabit PCI Express NIC	32-Bit, 64-Bit	32-Bit	WS 3, WS 4	AG393AA
Memory (DIMMs)		Windows Vista	Windows XP	Red Hat Linux	Part Number
	512 MB (1x 512 MB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV281AA
	1 GB (1x 1 GB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV282AA
	2 GB (1x 2 GB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EV283AA
	4GB (1x4GB) PC2-5300P DDR2-667 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	GY414AA
	8GB (1x8GB) PC2-4200P DDR2-533 ECC Address Parity Registered DIMM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	GT808AA

### After-Market Options

Monitors (Supported by all TFT displays)				Part Number
Operating Systems supplied by HP	HP LP3065 30-inch Widescreen LCD Monitor			EZ320A4
	HP LP2465 24-inch Widescreen LCD Monitor			EF224A4
	HP LP2065 20-inch LCD Monitor			EF227A4
	HP L1965 19-inch LCD Monitor			RA373AA

Optical drives	DVD-ROM Drive	Windows Vista	Windows XP	Red Hat Linux	Part Number
	16X DVD-ROM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	AA620B
	HP 16X/48X DVD-ROM SATA Drive	32-Bit, 64-Bit	32-Bit, 64-Bit	32-Bit, 64-Bit	EW268AA
	<b>Combo Drive</b>				
	SATA 48X CD-RW/DVD-ROM	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW267AA
	Combo Drive				
	<b>DVD+/-RW Drive</b>				
	SATA SuperMulti DVD+/-RW	32-Bit, 64-Bit	32-Bit, 64-Bit	WS 3, WS 4	EW269AA
	LightScribe*				

\* LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Removable Storage		Windows Vista	Windows XP	Red Hat Linux	Part Number
	HP 16-In-1 Media Card Reader with PCI Card	TBD	32-Bit, 64-Bit	Not supported	EM718AA
	HP 512 MB USB 2.0 Drive Key	TBD	32-Bit, 64-Bit	WS 3 & WS 4	ED516AA
	HP 1 GB USB 2.0 Drive Key	TBD	32-Bit, 64-Bit	WS 3 & WS 4	AG382AA
	1.44 MB Internal Floppy Drive	TBD	32-Bit	WS 3 & WS 4	DY670A
	HP StorageWorks DAT 40 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW023A
	HP StorageWorks DAT 40 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW022A
	HP StorageWorks DAT 72 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW027A
	HP StorageWorks DAT 72 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	DW026A
	HP StorageWorks DAT 160 USB external tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	Q1581A
	HP StorageWorks DAT 160 USB internal tape drive	32-bit, 64-bit	32-Bit, 64-Bit	WS 3, WS 4	Q1580A

### After-Market Options

		Windows Vista	Windows XP	Red Hat Linux	Part Number
Audio Card	Sound Blaster X-Fi XtremeMusic Audio Card	Not supported	32-Bit	Not supported	EA326AA
	HP USB Powered Stereo Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	32-Bit, 64-Bit	RD628AA
	HP Satellite Speakers	32-Bit, 64-Bit	32-Bit, 64-Bit	32-Bit, 64-Bit	ZD929AA
Security	HP Business PC Security Lock Kit				Part Number
	HP 2006 Business PC Security Lock Kit				PV606AA
	Kensington Security Cable & Lock				EV265AA
					PC766A
Rack kits / Chassis options	xw8000 Depth Adj Fixed Rail Rack Kit				Part Number
	HP xw8/9 Sliding Rail Rack Kit				AA640A
	HP xw8/9 Bulk 10 Pack PCI Hold Down Kit				DY664A
	HP Internal USB Port Kit				EN764AA
					EM165AA
Software	HP RGS PC 3-year Software Assurance	No	Yes	No	Part Number
	HP RGS V5 PC Edition	No	Yes	No	GN038AA
	HP RGS V5 Receiver Site License	No	Yes (Free Download)	Yes (Free Download)	GN034AA
	HP RGS V5 Workstation Edition	No	Yes	Yes	GN035AA
	HP RGS Workstation 3-year Software Assurance	No	Yes	Yes	GN036AA
	HP ProtectTools Quantity 1 Software	TBD	32-Bit	Not supported	EM530AA
	HP ProtectTools Quantity 25 Software	TBD	32-Bit	Not supported	EM531AA
	HP ProtectTools Quantity 500 Software	TBD	32-Bit	Not supported	EM532AA

### Mechanical Specifications

Form Factor	Minitower	
Color	Carbonite/Alloy metallic	
Expansion Slots (see mainboard section for additional details)	<ul style="list-style-type: none"> <li>2 PCI Express (PCIe) x16 75W+EXT75W (Graphics) slots</li> <li>2 PCIe x16 (8,4,1) slots</li> <li>Full-height PCI-X slots at 100 MHz, or 1 slot at 133 MHz, exclusive1 full-length PCI slot</li> </ul>	
Bays (see storage section for additional details)	<ul style="list-style-type: none"> <li>Five 3.5 inch bays</li> <li>Three 5.25 inch bays</li> </ul>	
Front I/O	4 ports: 2 USB 2.0, 1 headphone, 1 microphone, 1 IEEE 1394	
Rear I/O	16 ports: 6 USB 2.0, 1 standard serial 9-pin port, 1 IEEE 1394, 1 PS/2 keyboard, 1 PS/2 mouse, 2 RJ-45 to integrated Gigabit LAN, 1 Audio In, 1 Audio Line Out, 1 Mic In, S/PDIF OUT coax	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
Chassis Dimensions (H x W x D)	17.9 x 8.3 x 20.7 inches; 45.4 x 21.0 x 52.5 cm	
System Weight	Minimum config - 42 lb (19 kg) Standard config - 45 lb (20 kg) Maximum config - 54 lb (24 kg)	
Temperature	Operating	40° to 95° F (5° to 35° C)
	Non-operating	-40° to 140° F (-40° to 60° C)
Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (nonpressurized)	Operating	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	800W wide-ranging, active Power Factor Correction	
Interfaces Supported	6 SATA interface (6 serial-ATA connectors), 8 SAS interface, 2 EIDE interface (1 EIDE connectors) supported for optical drives.	
Hard Drive Controller (SAS/SATA) Supported	Serial Attached SCSI (RAID 0, 1, IME) or SATA 3 Gb/s (RAID 0, 1)	

Cooling	
Power Supply Fan	3.62 x 0.98 inches; 92 x 25 mm
Processor Fan-Heatsink	3.15 x 0.59 inches; 80 x 15 mm
Memory Fan	2.75 x 0.59 inches; 70 x 15 mm
Chassis Fan (front)	One 3.15 x 0.98 inches; 80x 25 mm)
Chassis Fan (rear)	One 4.72 x 0.98 inches; 120 mm x 25 mm (standard)

### Mechanical Specifications

<b>Power Supply</b>		
Power Supply	800 watt custom power supply - (Wide Ranging, Active PFC)	
Operating Voltage Range	90 - 269 VAC	
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 - 66 Hz	47 - 66 Hz
Rated Input Current	13.2A @ 100-120VAC 6.6 A @ 200-240VAC	13.2A @ 100-120VAC 6.6 A @ 200-240VAC
Heat Dissipation (Configuration and software dependent)	Typical 1950 btu/hr (491 kg-cal/hr) Maximum 3793 btu/hr (956 kg-cal/hr)	
Power Supply Fan	92x32 mm variable speed	
Blue Angel Compliant (<5W in S5 - Power Off)	N/A	
FEMP Standby Power Compliant @115V (<2W in S5 - Power Off, with Wake on LAN disabled)	NO	
Power Consumption in ES Mode - Suspend to RAM (S3) (Instantly Available PC)	< 10 W	

### Memory

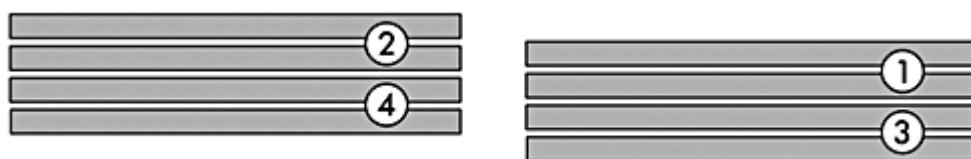
#### NVIDIA Nforce Professional 3000 Series

##### DDR2 SDRAM ECC REGISTERED MEMORY

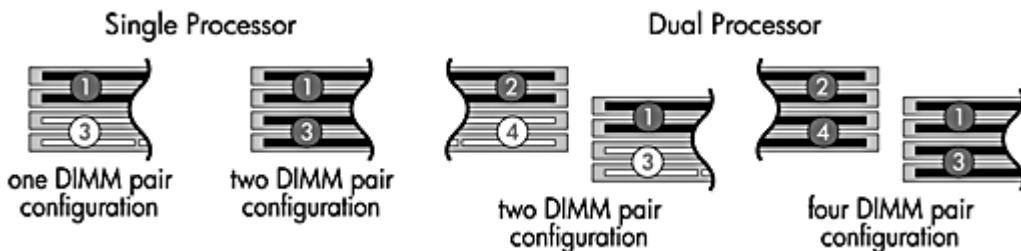
This chart does not represent all possible memory configurations. Each AMD Opteron processor has an integrated memory controller that supports ECC Registered 667 MHz (PC2 5300P) DDR2 or ECC Registered 533 MHz (PC2 4200) DDR2 memory. Main memory is directly connected to the processor through the Direct Connect Architecture. There are 8 DIMM slots in total, with 4 DIMM slots per processor, each processor offering a memory bandwidth transfer rate up to 10.2 GB/s. Over 32 GB requires dual CPUs, and will require 8 GB DIMMS (when available).

Memory must be added in pairs. Match DIMM pairs by size and type. Use only HP tested and validated memory.

The memory sockets are laid out on the mainboard as below:



Memory configurations for the HP xw9400 Workstation:



In a single processor configuration, install the first DIMM pair in socket set 1 (blue sockets), and the 2nd DIMM pair in socket set 3 (black socket).

In a dual processor configuration, install the first DIMM pair in socket set 1 (blue sockets), the 2nd DIMM pair in socket set 2 (blue sockets) and, if required, the 3rd pair in socket set 3 (black sockets) and the 4th pair in socket set 4 (black sockets).

##### MAXIMUM MEMORY

Supports up to 64 GB of DDR2 SDRAM, in a configuration of 32 GB per processor (over 32 GB requires dual CPUs and Quad Ranked DIMMS when supported).

##### POSSIBLE MEMORY CONFIGURATIONS

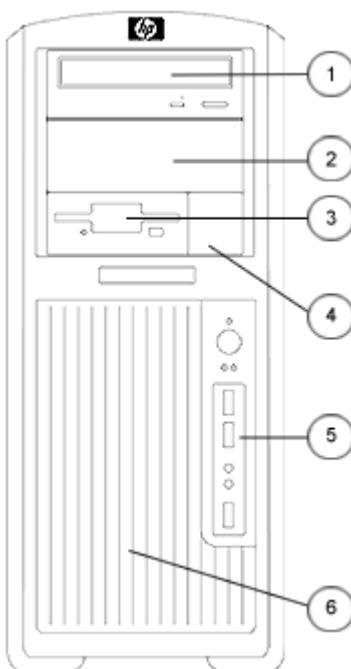
Not all memory configurations possible are represented below.

### Memory

	CPU 1				CPU 2			
	Socket set 2	Socket set 4			Socket set 1		Socket set 3	
1 GB					512 MB	512 MB		
2 GB					1 GB	1 GB		
2 GB					512 MB	512 MB		
2 GB					512 MB	512 MB		
4 GB					1 GB	1 GB		
8 GB					2 GB	2 GB		
2 GB (dual)	512 MB	512 MB			512 MB	512 MB		
4 GB (dual)	1 GB	1 GB			1 GB	1 GB		
4 GB (dual)	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
6 GB (dual)	1 GB	1 GB	512 MB	512 MB	1 GB	1 GB	512 MB	512 MB
8 GB (dual)	2 GB	2 GB			2 GB	2 GB		
8 GB (dual)	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB	1 GB
12 GB (dual)	2 GB	2 GB	1 GB	1 GB	2 GB	2 GB	1 GB	1 GB
16 GB (dual)	4 GB	4 GB			4 GB	4 GB		
16 GB (dual)	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB	2 GB
32 GB (dual)	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB	4 GB
64 GB (dual)	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB	8 GB

### Storage

Tower configuration



**Total Bays**

8

**Internal Bays**

Five 3.5 inch bays (4 with acoustic rail assemblies)

**External Bays**

Three 5.25 inch bays - top two support full-depth (210 mm maximum) devices. Bottom bay is depth restricted to 169 mm (including cables). Bays can be converted to internal 3.5 inch drive bays using optional bracket

Floppy drive bay using optional bracket. Consumes one 5.25 inch bay.

### Minitower

	Quantity Supported	Position Supported	Controller
Optional Diskette Drive	1	3	Diskette
5.25" Storage Drive Bays	3	1, 2, 3	IDE
3.5" Storage Drive Bays with acoustic dampening rail assemblies	5	4, 5, 6, 7, 8	SATA or SAS
			SCSI and SATA may be mixed in a Windows configuration; only the primary drive may be SATA. Linux does not support SATA controller or mixing SATA and SAS drives.

### Technical Specifications

ROM Features	Description
<b>Instantly Available PC</b>	Allows for very low power consumption with quick resume time
<b>ROM Based F10 Setup and Power-on Self Test</b>	Review and customize BIOS settings
<b>Remote System Installation via F12 (PXE) (remote boot from server)</b>	Allows a new or existing system to boot over the network and download software, including the operating system
<b>System/Emergency ROM Flash Recovery with Video</b>	Recovers corrupted system BIOS
<b>ROM Revision Levels</b>	Identifies system BIOS revision level and reports in ROM-based F10 setup. Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information
<b>System Board Revision Level</b>	Allows management SW to read the revision level of the system board Revision level is digitally encoded into the hardware and cannot be modified
<b>Auto Setup when new hardware installed</b>	System automatically detects addition of new hardware
<b>Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control</b>	Enable or disables serial, parallel, USB, audio, and network ports
<b>Removable Media Write/Boot Control</b>	Prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Power-on Password</b>	Prevents an unauthorized person from booting up the workstation
<b>Setup Password</b>	Prevents an unauthorized person from changing the workstation configuration
<b>Replicated Setup</b>	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
<b>Memory Change Alert (requires HP Client Manager Software)</b>	Alerts management console if memory is removed or changed
<b>Thermal Alert (requires HP Client Manager Software)</b>	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li><b>NORMAL</b> - normal temperature ranges</li> <li><b>ALERTED</b> - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown</li> <li><b>SHUTDOWN</b> - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs</li> </ul>
<b>Remote ROM Flash</b>	Provides secure, fail-safe ROM image management from a central network console
<b>Remote Wakeup/Shutdown</b>	<ul style="list-style-type: none"> <li>System administrators can power on, restart, and power off a client computer from a remote location.</li> <li>Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM</li> </ul>
<b>ACPI (Advanced Configuration and Power Interface)</b>	<ul style="list-style-type: none"> <li>Allows the system to enter and wake from a low power mode</li> <li>Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system</li> </ul> Supports ACPI 2.0 for full compatibility with 64-Bit operating system
<b>Keyboard-less Operation</b>	The system can be operated without a keyboard
<b>SMBIOS</b>	System Management BIOS 2.5, previously known as DMI BIOS, for system management information
<b>Localized ROM Setup</b>	Common BIOS image supports configuration (Setup) in 12 languages, with local keyboard mappings



### Technical Specifications

Asset Tag	Allows user or MIS to set unique tag string in ROM
Ownership Tag	Allows user or MIS to set unique tag string in ROM
Memory Scrubbing	Allows memory controller to transparently correct transient ECC errors in the background
Memory Remapping	Allows system memory lost to PCI devices to be reclaimed above 4 GB, for use with operating systems that support more than 4 GB (Microsoft Windows XP 64-Bit edition, Linux)
Per-slot Control	Allows individual slot configuration (option ROM, latency)
Adaptive Cooling	Fan control parameters are set according to detected hardware configuration for optimal acoustics
Pre-boot Diagnostics	Early (pre-video) critical errors are reported via beeps and blinks on the power LED

Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0c
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
BIOS 32-Bit Services	Standard BIOS 32-Bit Service Directory Proposal v0.4
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	<ul style="list-style-type: none"><li>Enhanced Disk Drive Specification Version 1.1</li><li>BIOS Enhanced Disk Drive Specification Version 3.0</li></ul>
PCI	<ul style="list-style-type: none"><li>PCI Local Bus Specification, Revision 2.3</li><li>PCI Power Management Specification, Revision 1.1</li></ul>
PCI Express	PCI Express Base Specification, Revision 1.0a
PMM	POST Memory Manager Specification, Version 1.01
SATA	<ul style="list-style-type: none"><li>Serial ATA Specification, Revision 1.0a</li><li>Serial ATA 3.0Gb/s: Extensions to Serial ATA 1.5Gb/s, Revision 1.0</li></ul>
SAS	SAS specification 1.1
SMBIOS	System Management BIOS Reference Specification, Version 2.5
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification

### Other Deployment & Management Features

HP Client Management Solutions	<p>HP Client Management Solutions help simplify management of Workstations and significantly reduce total ownership costs. HP has two distinct client management product lines.</p> <p>The first client management product line consists of HP OpenView Configuration Management Solutions and HP OpenView Client Configuration Manager.</p> <p>The second client management product line is comprised of the HP Client Premium Suite, HP Client Foundation Suite, and HP Client Manager</p> <p>To learn more about all of these solutions, visit <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a></p>
HP Client Manager	<p>HP Client Manager is available for free for use with all HP business PCs, Notebooks, and Workstations. It enables central tracking, monitoring, and management of the hardware aspects of HP client systems:</p> <ul style="list-style-type: none"><li>Get valuable hardware inventory information such as CPU, memory, video, and security settings</li><li>Monitor system health to fix problems before they occur</li><li>Install drivers and BIOS updates without visiting each PC</li></ul>



### Technical Specifications

	<ul style="list-style-type: none"><li>• Remotely configure BIOS and security settings</li><li>• Automate processes to quickly resolve hardware problems</li></ul> <p>Additional Altiris solutions (fee-based) are available to address Workstation management challenges through the entire IT lifecycle including:</p> <ul style="list-style-type: none"><li>• Inventory assessment</li><li>• Software license compliance</li><li>• Personality migration</li><li>• Software image deployment</li><li>• Software distribution</li><li>• Asset management</li><li>• Problem resolution</li></ul>
	Visit <a href="http://www.hp.com/go/clientmanager">http://www.hp.com/go/clientmanager</a> for more information, to download HP Client Manager, and to evaluate the Altiris solutions
<b>System Software Manager (free)</b>	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs and workstations
<b>HP Backup and Recovery Manager (included with PC)</b>	HP Backup and Recovery Manager saves your computer's software image on Recovery Discs (CDs or DVDs). You have the flexibility to save both the original factory software image that came with your HP computer and your software image that includes your customizations and data. These Recovery Discs enable full recovery of your computer should a critical hardware failure occur. Since HP now provides this simple tool to create your own Recovery Discs, HP commercial PCs that include HP Backup and Recovery Manager will not include factory restore CDs. HP Backup & Recovery Manager is preloaded on new HP commercial desktops, workstations, notebooks, and tablet PCs introduced starting March 2006*. For product availability, visit <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a> .
	<b>NOTE: *Up to 8 GB of the hard drive is reserved for the system recovery software.</b>
<b>Replicated Setup</b>	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
<b>Asset Tag</b>	<ul style="list-style-type: none"><li>• Repository for storing company-specific property asset numbers for easy tracking</li><li>• Initially set equal to the system serial number</li><li>• Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program</li></ul>
<b>DIMM Serial Presence Detect</b>	Detects whether or not memory DIMMs are present and their type
<b>Hard Drive Serial Number, Model, and Manufacturer</b>	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup
<b>Memory Change Alert (Requires HP Client Manager)</b>	Alerts management console if memory is removed or changed
<b>Ownership Tag</b>	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
<b>Protocol-level Integrity Monitoring</b>	A feature of SATA and SAS, Cyclic Redundancy Checking provides command, data and message transfer verification and proactive notification of problems with recommendations for enhancing system performance. It detects all the following errors types: <ul style="list-style-type: none"><li>• single bit errors</li><li>• double bit errors</li><li>• an odd number of errors</li><li>• error bursts up to 32-Bits long</li></ul>

### Technical Specifications

Drive Self Tests (DPS)	<ul style="list-style-type: none"><li>Drive Protection System</li><li>A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user.</li><li>Running independently of the operating system, it can be accessed through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced.</li></ul> <p>The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures.</p> <p>DPS Access through F10 Setup during Boot (F10 diagnostic access not available with SCSI drives)</p>
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted. Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count. By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure. SMART I - Drive Failure Prediction SMART II - Off-Line Data Collection SMART III - Off-Line Read Scanning with Defect Reallocation

Security Features	
Access Panel Key Lock (standard)	Prevents removal of the access panel and all internal components including optical and floppy drives
Padlock (optional)	Prevents entire system theft and discourages access panel removal. 7mm diameter padlock loop at rear of system.
Kensington Cable Lock (optional)	Prevents entire system theft only. 3mm x 7mm slot at rear of system.
Universal chassis clamp lock (optional)	The version without a cable discourages access panel removal and prevents theft of IO devices. The version with a cable additionally prevents entire system theft and allows multiple systems to be secured with a single cable.
HP ProtectTools Security Manager	<p>HP ProtectTools Security Manager can be configured to prevent unauthorized access using Smart Cards, TPM Embedded security chips, USB tokens and other security technologies. HP ProtectTools Security Manager is completely customizable, which gives customers the flexibility to choose the level of security that best meets their needs.</p> <ul style="list-style-type: none"><li>Smart Card security for HP ProtectTools<ul style="list-style-type: none"><li>Initialization and configuration of the Smart Card</li><li>Manage Smart Card accounts and security settings</li></ul></li><li>Embedded Security for HP ProtectTools<ul style="list-style-type: none"><li>TPM Embedded Security Chip configuration and management</li></ul></li><li>Credential Manager for HP ProtectTools<ul style="list-style-type: none"><li>Multifactor Windows Authentication</li><li>Single sign-on</li></ul></li><li>BIOS configuration for HP ProtectTools<ul style="list-style-type: none"><li>BIOS configuration and security settings from within the HP ProtectTools Security Manager console</li></ul></li></ul> <p>Visit <a href="http://h18004.www1.hp.com/products/security/">http://h18004.www1.hp.com/products/security/</a> for more information on HP ProtectTools</p>

Serviceability Features of System	
Access panel	Tool-less, one-handed



### Technical Specifications

Optical drives	Tool-less
Floppy drive	Drive requires screws to attach to bracket, once attached to mounting bracket, it latches toollessly to chassis
Hard drives	Tool-less
Expansion cards	Tool-less
Green user touch points	Yes, on tool-free internal chassis mechanisms
Color-coordinated cables and connectors	Yes
Memory	Tool-less, can be upgraded without removing any internal components
CPUs	Tool-less, can be upgraded without removing any internal components
Chassis fan removal	Tool-less
Power supply diagnostic LED	Yes, dual function: AC OK & power OK
Power Button	Yes, ACPI multi-function
Power LED	Yes, dual color LED indicates normal operation and faults.
Hard drive activity LED	Yes
Internal speaker	Yes, used for pre-boot diagnostic beep codes
Dual Color Power and HD LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	green – normal red – fault
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.
Configuration Record SW	Yes
Over-Temp Warning on Screen (Requires IM Agents)	Yes
OS CD (Restore OS CD)	Restores computer to its original factory shipping Operating System
Restore CD	Restores the computer to its original factory shipping image
Flash ROM	Yes
3.3V Aux Power LED on System PCA	Yes
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
Processor ZIF Socket for easy Upgrade	Yes
DIMM Connectors for easy Upgrade	Yes

### Technical Specifications

NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status
ASF 1.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Dual function front power switch	Causes a fail-safe power off when held for 4 seconds

Service and Support	<p>On-site Warranty and Service (<a href="#">Note 1</a>): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (<a href="#">Note 2</a>) service for parts and labor and includes free telephone support (<a href="#">Note 3</a>) 8am - 5pm. Global coverage (<a href="#">Note 2</a>) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.</p> <p><b>NOTE 1:</b> Terms and conditions may vary by country. Certain restrictions and exclusions apply.</p> <p><b>NOTE 2:</b> On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.</p> <p><b>NOTE 3:</b> Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.</p>
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Eco-Label Certifications & Declarations	<p>This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:</p> <ul style="list-style-type: none"> <li>US Federal Energy Management Program (FEMP)</li> <li>China Energy Conservation Program</li> <li>IT ECO declaration</li> <li>Japan PC Green label*</li> </ul> <p><b>*NOTE:</b> This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'</p>
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Longevity and Upgrading	<p>This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include:</p> <ul style="list-style-type: none"> <li>Dual AMD socket F (aka L1, 1207 pins)</li> <li>8 USB ports</li> <li>1 PCI slot, 2 PCI-X slots and 4 PCI Express slots</li> <li>8 expansion bays</li> <li>8 memory slots</li> </ul>
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### Technical Specifications

Batteries	<p>This product complies with ISO standards:</p> <ul style="list-style-type: none"><li>• EU Directive 91/ 157/ EEC</li><li>• EU Directive 93/ 86/ EEC</li><li>• EU Directive 98/ 101/ EEC</li></ul> <p>Batteries used in the product do not contain:</p> <ul style="list-style-type: none"><li>• Mercury greater than 5ppm by weight</li><li>• Cadmium greater than 10ppm by weight</li><li>• Lead greater than 4000ppm by weight.</li></ul> <p>Battery size: CR2032 (coin cell) Battery type: Lithium</p>
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### System Configuration

Example Configuration #1	Processor Info	2xOpteron 2216 2.4GHz 1MB
	Memory Info	4x1GB 667MHz
	Graphics Info	FX1500 256MB
	Disks/Optical/Floppy	1x80GB SATA / 2 Optical / 1 Floppy

Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)		207W		204W		208W	
Windows Busy Typ(S0)		258W		256W		264W	
Windows Busy Max (S0)		336W		333W		343W	
Sleep (S3)		6.5W	6.1W	6.5W	6.3W	6.2W	6.0W
Off (S5)		3.3W	3.1W	3.6W	3.2W	3.1W	2.8W

Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)		706 btu/hr		645 btu/hr		710 btu/hr	
Windows Busy Typ (S0)		882 btu/hr		872 btu/hr		899 btu/hr	
Windows Busy Max (S0)		1145 btu/hr		1138 btu/hr		1170 btu/hr	
Sleep (S3)		22.2 btu/hr	20.8 btu/hr	22.2 btu/hr	21.5 btu/hr	21.2 btu/hr	20.5 btu/hr
Off (S5)		11.3 btu/hr	10.6 btu/hr	12.9 btu/hr	10.9 btu/hr	10.6 btu/hr	9.6 btu/hr

### NOTES:

\* Energy Star low energy mode

\*\* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.

### Technical Specifications

Declared Noise Emissions (High and entry level configurations)		
<b>System Configuration (Entry-level)</b>	The entry-level configuration used for the Declared Noise Emissions for the Mini tower Desktop model is based on a "Typically Configured Desktop"	
<b>Processor Info</b>	2x 2.4 GHz AMD Opteron processors	
<b>Disks/Optical/Floppy</b>	1x 80 GB 7200 rpm SATA / 1 DVD-ROM/ 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		
	Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
<b>Idle</b>	4.4 Bels	26 dB
<b>SATA Hard drive Operating</b> (random reads - 30.3 reads/sec)	4.4 Bels	26 dB
<b>Floppy Drive Operating</b> (continuous copy)	4.8 Bels	32 dB
<b>DVD-ROM Operating</b> (sequential reads)	5.0 Bels	33 dB
<b>System Configuration (High-end)</b>	The high-end configuration used for the Declared Noise Emissions for the Mini tower Desktop model is based on a "Typically Configured Desktop"	
<b>Processor Info</b>	2x 2.8 GHz AMD Opteron processors	
<b>Graphics Info</b>	Quadro FX 3500 with active heatsink	
<b>Disks/Optical/Floppy</b>	1x 72 GB 15K rpm SAS / 1 DVD-ROM / 1 Floppy	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		
	Sound Power (LWad, bels)	Deskside Sound Pressure (LpAm, decibels)
<b>Idle</b>	4.5 Bels	26 dB
<b>SATA Hard drive Operating</b> (random reads - 30.3 reads/sec)	4.9 Bels	33 dB
<b>Floppy Drive Operating</b> (continuous copy)	4.8 Bels	32 dB
<b>DVD-ROM Operating</b> (sequential reads)	5.0 Bels	34 dB
<b>Additional Information</b>	<ul style="list-style-type: none"> <li>This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.</li> <li>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.</li> <li>Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.</li> <li>This product contains 0% recycled materials (by wt.)</li> <li>This product is &gt;90% recycle-able when properly disposed of at end of life.</li> </ul>	
<b>Packaging Materials</b>		
External	Cardboard carton and insert	2.70 kg
Internal	LDPE Foam	0.35 kg

### Technical Specifications

<b>Material Usage</b>	<p>This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html</a>):</p> <ul style="list-style-type: none"><li>• Asbestos</li><li>• Certain Azo Colorants</li><li>• Certain Brominated Flame Retardants - may not be used as flame retardants in plastics</li><li>• Cadmium</li><li>• Chlorinated Hydrocarbons</li><li>• Chlorinated Paraffins</li><li>• Formaldehyde</li><li>• Halogenated Diphenyl Methanes</li><li>• Lead carbonates and sulfates</li><li>• Lead and Lead compounds</li><li>• Mercuric Oxide Batteries</li><li>• Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.</li><li>• Ozone Depleting Substances</li><li>• Polybrominated Biphenyls (PBBs)</li><li>• Polybrominated Diphenyl Ethers (PBDEs)</li><li>• Polybrominated Biphenyl Oxides (PBOs)</li><li>• Polychlorinated Biphenyl (PCB)</li><li>• Polychlorinated Terphenyls (PCT)</li><li>• Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.</li><li>• Radioactive Substances</li><li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li></ul>
<b>Packaging</b>	<p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"><li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li><li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li><li>• Design packaging materials for ease of disassembly.</li><li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li><li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li><li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li><li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li></ul>
<b>End-Of-Life Management and Recycling</b>	<p>Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.</p>

### Technical Specifications

<b>Hewlett-Packard Corporate Environmental Information</b>	For more information about HP's commitment to the environment: [link to new HP white paper now in progress] Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a> Eco-label certifications <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a> ISO 14001 certificates: <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a>
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### Technical Specifications - Audio

High Definition Integrated Type	Integrated
Realtek ALC262 Audio	High Definition Codec
	SPDIF
	External audio jacks
	One Front Stereo Analog Microphone-In One Front Stereo Headphone-Out One Rear Line-In One Rear Line-Out One Rear Stereo Analog Microphone-In
Retasking	<b>NOTE:</b> All audio ports are retaskable as Line-In, Line-Out, Microphone-In, or Headphone-Out
Sampling	44.1 kHz/48 kHz/96 kHz/192 kHz (output only)
Wavetable syntheses (software)	Yes - Uses OS soft wavetable
Digital audio	Yes
Analog audio	Yes
Number of channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
Internal audio speaker power rating	1.5 W
Internal speaker	Yes
Microphone features	Acoustic Echo Cancellation Noise Suppression Beam Forming

SoundBlaster X-Fi XtremeMusic Audio Card	Audio Quality	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%
	Signal to Noise Ratio (SNR)	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) Stereo Output: 109dB Front and Rear Channels: 109dB Center, Subwoofer and Side Channels: 109dB
	Sound Conversion	24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output 24-bit Digital-to-Analog conversion of stereo digital sources at 192kHz to stereo output
	Recording/Sampling Rate	16-bit to 24-bit recording sampling rates: 8, 11.025, 16, 22.05, 24, 32, 44.1, 48 and 96 kHz
	ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring
	Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz

### Technical Specifications - Audio

DACs	24-bit/192kHz
Voice Support	128 voices
Max. Channels in 3D	7.1
Positional Audio	
EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™
Connectors	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks AUX_IN line-level analog input via 4-pin Molex connector on card One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)
Dimensions	7.25" x5" x .9" (18.415 x 12.7 x 2.286 cm)
Additional product features	Movies THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback Music X-Fi 24-bit Crystalizer CMSS-3D SuperRip Audio Creation Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI
Minimum System Requirements	System RAM 256 MB Hard Disk 600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation Operating System Microsoft Windows XP Service Pack 2 (SP2)

### Technical Specifications - Communications

<b>Integrated NVIDIA LAN-on-Motherboard</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	NVIDIA Gigabit Controller with Marvell PHY
	<b>Data rates supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.3-2000
	<b>Bus architecture</b>	Integrated plus RGMII interface
	<b>Data transfer mode</b>	DMA
	<b>Hardware certifications</b>	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	<b>Power requirement</b>	1.5 watts @ +3.3V AUX supply
	<b>Boot ROM support</b>	Yes
	<b>Network transfer rate</b>	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	<b>Operating system driver support</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows NT® 4.0, Microsoft Windows 98, Microsoft Windows 2000, Microsoft Windows XP, Linux 2.2, Linux 2.4
	<b>Management capabilities</b>	WOL, PXE and NVIDIA control console

<b>Intel Pro/1000 GT Gigabit NIC (PCIe)</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel 82541PI Gigabit Controller
	<b>Memory</b>	Integrated 64 KB
	<b>Data rates supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	<b>Bus architecture</b>	PCI 2.3
	<b>Data path width</b>	32-Bit PCI
	<b>Data path speed</b>	32 bit 33/66 MHz - 266 Mb/s full duplex
	<b>Data transfer mode</b>	Bus-master DMA
	<b>Hardware certifications</b>	FCC class , BSMI B for Taiwan, VCCI B for Japan
	<b>Power requirement</b>	800 mA @ +5 VDC
	<b>IEEE support</b>	802.2 and 802.3ab
	<b>Network transfer rate</b>	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 1000BASE-T, 1000 Mbps
	<b>Environmental</b>	<b>Operating temperature</b> 32° to 131° F (0° to 55° C) <b>Operating humidity</b> 85% at 131° F (55° C)
	<b>Dimensions</b>	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x .2 cm
	<b>Operating system driver support</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4

### Technical Specifications - Communications

<b>Management capabilities</b>	ACPI, Wake on LAN, Preboot Execution Environment, WfM Baseline v2.0, DMI 2.0 support, Windows Management Instrumentation, SNMP-manageable Offline Diagnostics, Intel Boot Agent
<b>Kit contents</b>	IEEE 802.1Q Virtual Local Area Network (VLANs), IEEE 802.3x Flow Control, Transmission Control Protocol (TCP), Checksum Offload, IEEE 802.1p, Intel Priority Packet II.

<b>Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe)</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Broadcom 5751 PCI-E 1.0a LAN Controller
	<b>Memory</b>	Integrated 96Kb frame buffer memory
	<b>Data rates supported</b>	10/100/1000 Mbps
	<b>Compliance</b>	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	<b>Bus architecture</b>	PCI-E 1.0a
	<b>Data path width</b>	X1
	<b>Data path speed</b>	2.5Gbit per sec per direction transfer rate
	<b>Data transfer mode</b>	Bus-master DMA
	<b>Hardware certifications</b>	FCC class B, NRTL Mark Canada and United States, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia
	<b>Power requirement</b>	3.1 watts @ +3.3V AUX supply
	<b>Boot ROM support</b>	Yes
	<b>Network transfer rate</b>	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	<b>Environmental</b>	<b>Operating temperature</b> 32° to 131° F (0° to 55° C) <b>Operating humidity</b> 85% at 131° F (55° C)
	<b>Dimensions</b>	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x 0.2 cm
	<b>Operating system driver support</b>	Microsoft Windows 2000 and XP, Red Hat Linux 7.2, 7.3 and Red Hat Enterprise Linux 3
	<b>Management capabilities</b>	WOL, PXE, Remote cable management
	<b>Alerting</b>	ASF 2.0
	<b>Kit contents</b>	Broadcom 5751, CD, Broadcom 5751 Netxtreme Gigabit PCIe NIC, drivers, quick install guide, product warranty statement

### Technical Specifications - Controllers

LSI SAS 8344ELP 3Gb/s RAID Controller	PCI Bus	PCI-Express x4 lanes
	PCI Modes	Bus Master DMA
	RAID Levels	0, 1, 5, 10 and 50
	PCI data burst transfer rate	1.0 GBps ( half duplex ) 2.0 GBps ( full duplex )
	SAS Bandwidths	<b>Half Duplex</b> Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps <b>Full Duplex</b> Single SAS Lane – 600 MBps Wide Port (2 lanes) – 1200 MBps Wide Port (4 lanes) – 2400 MBps
	PCI Card Type	3.3 volt add-in card
	PCI Voltage	12 V ± 10%
	PCI Form Factor	6.6" x 2.731" (Low-profile)
	PCI Power	7.5 Watts
	Bracket	Full height and Low-profile
	Certification Level	PCI-Express 1.0a
	IO Bus	Eight 3Gbps SAS/SATA ports
	SAS Processor	Intel IOP333 I/O Processor
	Internal Connectors	One SAS SFF8087 x4 internal connector
	External Connectors	One SAS SFF8470 x4 external connector
	Max. Number of SAS Devices	32
	LED Indicators	On-board activity and fault LEDs
	Integrated Mirroring	Integrated Mirroring option available
	Environments	Operating Storage
	Temperature	32° to 140° F (0° to 60° C) -49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing 5% to 90% non-condensing
	MTBF	>200,000 hours
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04); Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950
	Operating system support	Microsoft® Windows® XP Professional, XP Professional x64 Red Hat Linux WS3 and WS4
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.

\* Due to the placement of the I/O controller engine on the SAS 8344ELP, external cables from the SAS 8344ELP RAID controller to the storage enclosure may not be longer than two meters; this card also does not support the use of external fan-out cables. See [http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c00817918&jumpid=reg\\_R1002\\_USEN](http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c00817918&jumpid=reg_R1002_USEN) for additional information

### Technical Specifications - Controllers

LSI SAS3041E Serial Attach SCSI (SAS) Host Bus Adapter (HBA)	PCI Bus	PCI-Express x4 lanes
	PCI Modes	Bus Master DMA
	PCI data burst transfer rate	1.0 GBps ( half duplex ) 2.0 GBps ( full duplex )
	SAS Bandwidths	<b>Half Duplex</b> Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps <b>Full Duplex</b> Single SAS Lane – 600 MBps Wide Port (2 lanes) – 1200 MBps Wide Port (4 lanes) – 2400 MBps
	PCI Card Type	3.3 volt add-in card
	PCI Voltage	12 V ± 10%
	PCI Form Factor	6.6" x 2.731" (Low-profile)
	PCI Power	7.5 Watts
	Bracket	Full height and Low-profile
	Certification Level	PCI-Express 1.0a
	IO Bus	Four 3Gbps SAS / 1.5Gbps SATA ports
	SAS Processor	LSISAS1064E
	Internal Connectors	Four- SATA x1 connectors
	External Connectors	None
	Max. Number of SCSI Devices	128
	LED Indicators	On-board activity and fault LEDs
	Integrated Mirroring	Integrated Mirroring option available
	Environments	Operating Storage
	Temperature	32° to 140° F (0° to 60° C) -49° to +221° F (-45° to +105° C)
	Relative Humidity	5% to 90% non-condensing 5% to 90% non-condensing
	MTBF	>200,000 hours
	Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04); Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950
	Operating system support	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, XP Professional x64, Red Hat Enterprise Linux 4 & 5 Desktop
	Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.

### Technical Specifications - Controllers

Adaptec SCSI RAID 2120S Card	<b>Dimensions (H x D)</b>	2.5 x 6.6 inches; 6.4 x 16.8 cm Low profile card
	<b>RAID level</b>	0, 1, 10, 5, 50, JBOD
	<b>Data Transfer Rate</b>	Up to 320 MB/s
	<b>Cache Memory</b>	64 MB (onboard)
	<b>Device Support</b>	Up to 15 SCSI devices
	<b>Bus Type</b>	64-bit/66 MHz PCI (Also support 32-bit/33 MHz PCI)
	<b>Internal Connectors</b>	One 68-pin high-density
	<b>External Connectors</b>	One 68-pin VHDCI
	<b>System Requirements</b>	Intel PC or equivalent with available PCI slot
	<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
	<b>Power Requirements</b>	4 amps @ +5V
	<b>Operating System Support</b>	Windows 2000 Professional, Windows XP Professional, Windows XP Professional x64 Edition
	<b>Other</b>	Optimized disk utilization Online RAID Level Migration Online capacity expansion Immediate RAID availability (background initialization) S.M.A.R.T. support
	<b>Kit Contents</b>	Controller card, driver CD, LED cables, user documentation and warranty card.

### Technical Specifications - Hard Drives

Serial ATA Hard Drives	1 TB (7,200 rpm)	<b>Capacity</b>	1,000,204,886,016 bytes
		<b>Height</b>	1 inches; 2.54 cm
		<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
		<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 300 MB/s
		<b>Cache</b>	32 MB
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2.0 ms <b>Average</b> 14.5 ms <b>Full-Stroke</b> 33 ms
		<b>Rotational Speed</b>	7,200 rpm
		<b>Logical Blocks</b>	1,953,525,168
		<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)
		<b>Capacity</b>	750,156,374,016 bytes
750 GB (7,200 rpm)		<b>Height</b>	1 inches; 2.54 cm
		<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
		<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 3.0 Gb/s
		<b>Cache</b>	16 MB
		<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms <b>Average</b> 11 ms <b>Full-Stroke</b> 21 ms
		<b>Rotational Speed</b>	7,200 rpm
		<b>Logical Blocks</b>	1,465,149,168
		<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

### Technical Specifications - Hard Drives

<b>500 GB</b> (7,200 rpm)	<b>Capacity</b>	500,107,862,016 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 3.0 Gb/s
	<b>Cache</b>	16 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms <b>Average</b> 11 ms <b>Full-Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
	<b>Logical Blocks</b>	976,773,168
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)
 <b>250 GB</b> (7,200 rpm)	<b>Capacity</b>	250,059,350,016 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s) Native Command Queuing enabled (Model EA788AA only)
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 3.0 Gb/s
	<b>Cache</b>	With NCQ (Model EA788AA): 16 MB Without NCQ (Model PY278AA): 8 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms <b>Average</b> 11 ms <b>Full-Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
	<b>Logical Blocks</b>	488,397,168
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

### Technical Specifications - Hard Drives

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<b>160 GB</b> (7,200 rpm)	<b>Capacity</b>	160,041,885,696 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s)
	<b>Synchronous Transfer Rate (Maximum)</b>	Serial ATA (3.0 Gb/s), Native Command Queuing enabled
	<b>Cache</b>	8 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms <b>Average</b> 11 ms <b>Full-Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
	<b>Logical Blocks</b>	312,581,808
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

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<b>80 GB</b> (7,200 rpm)	<b>Capacity</b>	80,026,361,856 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (3.0 Gb/s)
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 3 Gb/s
	<b>Cache</b>	8 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 2 ms <b>Average</b> 11 ms <b>Full-Stroke</b> 21 ms
	<b>Rotational Speed</b>	7,200 rpm
	<b>Logical Blocks</b>	156,301,488
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

### Technical Specifications - Hard Drives

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<b>160 GB</b> (10k rpm)	<b>Capacity</b>	160,041,885,696 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 1.5 Gb/s
	<b>Cache</b>	16 Mbytes
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 0.3 ms <b>Average</b> 4.6 ms <b>Full-Stroke</b> 10.2 ms
	<b>Rotational Speed</b>	10,000 rpm
	<b>Logical Blocks</b>	312,581,808
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

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<b>80 GB</b> (10k rpm)	<b>Capacity</b>	80,026,361,856 bytes
	<b>Height</b>	1 inches; 2.54 cm
	<b>Width</b>	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm
	<b>Interface</b>	Serial ATA (1.5 Gb/s), Native Command Queuing enabled
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 1.5 Gb/s
	<b>Cache</b>	16 Mbytes
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 0.3 ms <b>Average</b> 4.6 ms <b>Full-Stroke</b> 10.2 ms
	<b>Rotational Speed</b>	10,000 rpm
	<b>Logical Blocks</b>	156,301,488
	<b>Operating Temperature</b>	41° to 131°F (5° to 55°C)

### Technical Specifications - Hard Drives

Serial Attached SCSI (SAS) 300 GB Hard Drives	Capacity	300,000,000,000 bytes
	Height	1.0 inches; 25.4 mm
	Width	4.0 inches; 101.6 mm
	Interface	SAS
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s
	Buffer	16 MB
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.2 ms Average 3.5 ms Full-Stroke 7.0 ms
	Rotational Speed	15,000 rpm
	Logical Blocks	585,937,500 - 512 byte blocks
	Operating Temperature	50° to 95° F (10° to 35° C)
146 GB (15K rpm)	Capacity	146,815,737,856 bytes
	Height	1.0 inches; 25.4 mm
	Width	4.0 inches; 101.6 mm
	Interface	SAS
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s
	Buffer	16 MB
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.27 ms Average 3.5 ms Full-Stroke 7.4 ms
	Rotational Speed	15,000 rpm
	Logical Blocks	286,749,488 - 512 byte blocks
	Operating Temperature	50° to 95° F (10° to 35° C)
73 GB (15K rpm)	Capacity	73,407,865,856 bytes
	Height	1.0 inches; 25.4 mm
	Width	4.0 inches; 101.6 mm
	Interface	SAS
	Synchronous Transfer Rate (Maximum)	3.0 Gb/s
	Buffer	16 MB
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.2 ms Average 3.5 ms Full-Stroke 7.4 ms
	Rotational Speed	15,000 rpm
	Logical Blocks	143,374,738 - 512 byte blocks
	Operating Temperature	50° to 95° F (10° to 35° C)

### Technical Specifications - Hard Drives

<b>300 GB</b> (10K rpm)	<b>Capacity</b>	300,000,000,000 bytes
	<b>Height</b>	1.0 inches; 25.4 mm
	<b>Width</b>	4.0 inches; 101.6 mm
	<b>Interface</b>	SAS
	<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s
	<b>Buffer</b>	16 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> .3 ms <b>Average</b> <4.5 ms <b>Full-Stroke</b> <11.0 ms
	<b>Rotational Speed</b>	10,000 rpm
	<b>Logical Blocks</b>	585,937,500 - 512 byte blocks
	<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)
 <b>146 GB</b> (10K rpm)	<b>Capacity</b>	146,815,737,856 bytes
	<b>Height</b>	1.0 inches; 25.4 mm
	<b>Width</b>	4.0 inches; 101.6 mm
	<b>Interface</b>	SAS
	<b>Synchronous Transfer Rate (Maximum)</b>	3.0 Gb/s
	<b>Buffer</b>	16 MB
	<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<b>Single Track</b> 0.3 msec <b>Average</b> <4.5 msec <b>Full-Stroke</b> <11.0 msec
	<b>Rotational Speed</b>	10,000 rpm
	<b>Logical Blocks</b>	286,749,488 - 512 byte blocks
	<b>Operating Temperature</b>	50° to 95° F (10° to 35° C)

### Technical Specifications - Removable Storage

HP USB 2.0 Drive Key	Dimensions (HxWxD)	0.9 x 0.7 x 3.9 in (2.3 x 1.8 x 9.8 cm)
Weight	0.05 lb (0.02 kg)	
USB Specification	2.0	
Transfer Rate	Read-1023 KB/Sec; Write-850 KB/Sec	
Storage Media	Solid state flash memory, no moving parts	
Power Supply	USB Bus-powered, no external power required	
Capacity	512 MB or 1 GB	

### Technical Specifications - Input/Output Devices

<b>FireWire 4-Port PCI Card</b> (Windows XP only)	<b>Host Bus</b>	Burst Data Rate	800 Mbps
	<b>Devices Supported</b>		IEEE-1394 compliant devices
	<b>Bus Interface</b>		PCI
	<b>Physical</b>		PCI card with brackets for full height PCI slots.
	<b>Environmental</b>	<b>Operating temperature</b>	50° to 131° F (10° to 55° C)
		<b>Non-operating temperature</b>	-22° to 140° F (-30° to 60° C)
		<b>Relative humidity</b>	20% to 80%
	<b>Ports</b>		Two IEEE 1394b bilingual 9-pin Connectors (Rear)
	<b>Connectors</b>		One 10-Pin (9 Contacts) Custom Connector (Internal) to front panel IEEE-1394a 6-pin connector
	<b>Minimum System Requirements</b>		Microsoft Windows XP Professional, Windows XP Home Pentium III or higher 128-MB RAM 1-GB Hard Drive CD-ROM drive Built-in sound system Available PCI slot

<b>PS/2 OR USB Standard Keyboard</b>	<b>Physical characteristics</b>	<b>Keys</b>	104, 105, 106, 107, 109 layout (depending upon country)
		<b>Dimensions (L x W x H)</b>	18.0 x 6.4 x 0.98 inches; 45.8 x 16.3 x 2.5 cm
		<b>Weight</b>	2 lb (0.9 kg) minimum
	<b>Electrical</b>	<b>Operating voltage</b>	+ 5VDC ± 5%
		<b>Power consumption</b>	50-mA maximum (with three LEDs ON)
		<b>ESD</b>	CE level 4, 15-kV air discharge
		<b>EMI - RFI</b>	Conforms to FCC rules for a Class B computing device
		<b>Microsoft PC 99 - 2001</b>	Functionally compliant
	<b>Mechanical</b>	<b>Languages</b>	38 available
		<b>Keycaps</b>	Low-profile design
		<b>Switch actuation</b>	55-g nominal peak force with tactile feedback
		<b>Switch life</b>	20 million keystrokes (using Hasco modified tester)
		<b>Switch type</b>	Contamination-resistant switch membrane
<b>Environmental</b>	<b>Key-leveling mechanisms</b>		For all double-wide and greater-length keys
	<b>Cable length</b>		6 feet; 1.8 m
	<b>Microsoft PC 99 - 2001</b>		Mechanically compliant
	<b>Acoustics</b>		43-dBA maximum sound pressure level
	<b>Operating temperature</b>		50° to 122° F (10° to 50° C)
	<b>Non-operating temperature</b>		-22° to 140° F (-30° to 60° C)
	<b>Operating humidity</b>		10% to 90% (non-condensing at ambient)

### Technical Specifications - Input/Output Devices

<b>Non-operating humidity</b>	20% to 80% (non-condensing at ambient)
<b>Operating shock</b>	40 g, six surfaces
<b>Non-operating shock</b>	80 g, six surfaces
<b>Operating vibration</b>	2-g peak acceleration
<b>Non-operating vibration</b>	4-g peak acceleration
<b>Drop (out of box)</b>	26 inches; 66 cm on carpet, six-drop sequence
<b>Drop (in box)</b>	42 inches; 107 cm on concrete, 16-drop sequence
<b>Operating system support</b>	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4
<b>Approvals</b>	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
<b>Ergonomic compliance</b>	ANSI HFS 100, ISO 9241-4, and TUVGS
<b>Kit contents</b>	Keyboard, keyboard software media, installation guide, warranty card, safety and comfort

<b>HP USB Smart Card Keyboard</b>	<b>Smart card compatibility</b>	<b>HP</b>	<b>HP ProtectTools Smart Card</b>
		<b>American Express</b>	Amex Blue
		<b>Axalto (Schlumberger)</b>	Cryptoflex 8K Cryptoflex 16K Cryptoflex 32K Cryptoflex 32K e-gate Cyberflex Access 64K Cyberflex Access 32K Cyberflex 32K e-gate Cyberflex 64K Cyberflex Palmera Payflex-S Payflex 1K Payflex 2K Payflex 4K Payflex 8K Prisma US DoD CAC
		<b>Cardlogix</b>	CLXSU004KK4 CLXSU008KK5
		<b>Safenet, Inc.</b>	Model 300 Model 330
		<b>De La Rue</b>	VisaCash
		<b>GEMPLUS</b>	Gem Expresso GKK32K Gemclub Memo GemClub Micro GemXplore GemSafe
		<b>Infineon</b>	SLE66C322P
		<b>SafLink (Litronic)</b>	Forte

### Technical Specifications - Input/Output Devices

Sharp	Java Card
Oberthur	CosmopolIC v4 CosmopolIC v4.1 Cosmo ID-One GalatIC v2.1 US DoD CAC
Memory Cards	AT24C01ASC AT24C02SC AT24C04SC AT24C08SC AT24C16SC AT24C32SC AT24C64SC AT24C128SC AT24C256SC AT24C512SC AT88SC153 AT88SC1608
Axalto (Schlumberger)	PrimeFlex Store 8K PrimeFlex Store 2K
nfineon	SLE4406 SLE4406E SLE4406E SE SLE4418 SLE4428 SLE4432 SLE4436E SLE4442 SLE5536
ISSI	IS23SC4418 IS23SC4428
ST	14C02
Telefonkarte	SLE4406 SLE4436 SLE5536
XICOR	X24026

### Technical Specifications - Input/Output Devices

HP 2-Button Scroll Mouse (PS/2)	Scroll Wheel	8 mm															
	Maximum Rotation Speed	30 mm/s															
	Switch Type	Light force micro-switch															
	Switch Life	1 million operations															
	Mechanical Life	Minimum 200,000 revolutions															
	Environmental	<table><tr><td>Operating temperature</td><td>50° to 122° F (10° to 50° C)</td></tr><tr><td>Non-operating temperature</td><td>-22° to 140° F (-30° to 60° C)</td></tr><tr><td>Operating humidity</td><td>10% to 90% (non-condensing at ambient)</td></tr><tr><td>Non-operating humidity</td><td>20% to 80% (non-condensing at ambient)</td></tr><tr><td>Operating shock</td><td>40 g, 6 surfaces</td></tr><tr><td>Non-operating shock</td><td>80 g, 6 surfaces</td></tr><tr><td>Operating vibration</td><td>2 g peak acceleration</td></tr><tr><td>Non-operating vibration</td><td>4 g peak acceleration</td></tr></table>	Operating temperature	50° to 122° F (10° to 50° C)	Non-operating temperature	-22° to 140° F (-30° to 60° C)	Operating humidity	10% to 90% (non-condensing at ambient)	Non-operating humidity	20% to 80% (non-condensing at ambient)	Operating shock	40 g, 6 surfaces	Non-operating shock	80 g, 6 surfaces	Operating vibration	2 g peak acceleration	Non-operating vibration
Operating temperature	50° to 122° F (10° to 50° C)																
Non-operating temperature	-22° to 140° F (-30° to 60° C)																
Operating humidity	10% to 90% (non-condensing at ambient)																
Non-operating humidity	20% to 80% (non-condensing at ambient)																
Operating shock	40 g, 6 surfaces																
Non-operating shock	80 g, 6 surfaces																
Operating vibration	2 g peak acceleration																
Non-operating vibration	4 g peak acceleration																
Electrical	<table><tr><td>Operating voltage</td><td>5 VDC ± 10%</td></tr><tr><td>Power consumption</td><td>15 mA</td></tr><tr><td>System consumption</td><td>PS/2 mini-din connector</td></tr><tr><td>ESD</td><td>CE level 4, 15 kV air discharge</td></tr><tr><td>EMI-RFI</td><td>Conforms to FCC rules for a Class B computing device</td></tr></table>	Operating voltage	5 VDC ± 10%	Power consumption	15 mA	System consumption	PS/2 mini-din connector	ESD	CE level 4, 15 kV air discharge	EMI-RFI	Conforms to FCC rules for a Class B computing device						
Operating voltage	5 VDC ± 10%																
Power consumption	15 mA																
System consumption	PS/2 mini-din connector																
ESD	CE level 4, 15 kV air discharge																
EMI-RFI	Conforms to FCC rules for a Class B computing device																
	<table><tr><td>Microsoft PC99 - 2001</td><td>Functionally compliant</td></tr></table>	Microsoft PC99 - 2001	Functionally compliant														
Microsoft PC99 - 2001	Functionally compliant																
Mechanical	<table><tr><td>Resolution</td><td>400 ± 20% DPI</td></tr><tr><td>Tracking Speed</td><td>10 in/s maximum</td></tr><tr><td>Acceleration</td><td>100 in/s</td></tr><tr><td>Switch Actuation</td><td>85 g nominal peak force</td></tr><tr><td>Switch Life</td><td>1,000,000 operations (using Hasco modified tester)</td></tr><tr><td>Cable Length</td><td>2 m</td></tr></table>	Resolution	400 ± 20% DPI	Tracking Speed	10 in/s maximum	Acceleration	100 in/s	Switch Actuation	85 g nominal peak force	Switch Life	1,000,000 operations (using Hasco modified tester)	Cable Length	2 m				
Resolution	400 ± 20% DPI																
Tracking Speed	10 in/s maximum																
Acceleration	100 in/s																
Switch Actuation	85 g nominal peak force																
Switch Life	1,000,000 operations (using Hasco modified tester)																
Cable Length	2 m																
Regulatory Approvals	PC98-99 UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick																

HP PS/2 2-Button Optical Dimensions (H x L x W) Scroll Mouse (EY703AA)	Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)													
	Weight	4.44 oz (126 g)													
	Environmental	<table><tr><td>Operating temperature</td><td>-32° to 104°F (0° to 40° C)</td></tr><tr><td>Non-operating temperature</td><td>-4° to 140°F (-20° to 60° C)</td></tr><tr><td>Operating humidity</td><td>10% to 90% (non-condensing at ambient)</td></tr><tr><td>Non-operating humidity</td><td>10% to 90% non-condensing</td></tr><tr><td>Operating shock</td><td>40 g, 6 surfaces</td></tr><tr><td>Non-operating shock</td><td>80 g, 6 surfaces</td></tr><tr><td>Operating vibration</td><td>2 g peak acceleration</td></tr></table>	Operating temperature	-32° to 104°F (0° to 40° C)	Non-operating temperature	-4° to 140°F (-20° to 60° C)	Operating humidity	10% to 90% (non-condensing at ambient)	Non-operating humidity	10% to 90% non-condensing	Operating shock	40 g, 6 surfaces	Non-operating shock	80 g, 6 surfaces	Operating vibration
Operating temperature	-32° to 104°F (0° to 40° C)														
Non-operating temperature	-4° to 140°F (-20° to 60° C)														
Operating humidity	10% to 90% (non-condensing at ambient)														
Non-operating humidity	10% to 90% non-condensing														
Operating shock	40 g, 6 surfaces														
Non-operating shock	80 g, 6 surfaces														
Operating vibration	2 g peak acceleration														



### Technical Specifications - Input/Output Devices

	<b>Non-operating vibration</b>	4 g peak acceleration
	<b>Drop</b> (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
<b>Electrical</b>	<b>Operating voltage</b>	5 VDC $\pm$ 10%
	<b>Power consumption</b>	100mA
	<b>System consumption</b>	PS/2 mini-din connector
	<b>ESD</b>	CE level 4, 15 kV air discharge
	<b>EMI-RFI</b>	Conforms to FCC rules for a Class B computing device
	<b>Microsoft PC99 - 2001</b>	Functionally compliant
<b>Mechanical</b>	<b>Resolution</b>	400 $\pm$ 20% DPI
	<b>Tracking Speed</b>	10 in/s (25.4 cm/s) maximum
	<b>Acceleration</b>	100 in/s/s (2.54 m/s/s)
	<b>Switch Actuation</b>	61 g nominal peak force
	<b>Switch Life</b>	3,000,000 operations (using Hasco modified tester)
	<b>Switch type</b>	Low force micro-switches
<b>Scroll wheel</b>	<b>Tracking mechanism life</b>	155 mi (250 km) at average speed of 10 in/s
	<b>Cable Length</b>	6 ft (1.8 m)
	<b>Microsoft PC99 - 2001</b>	Mechanically compliant
	<b>Width</b>	8 mm
	<b>Diameter</b>	1.01 in (25.6 mm)
	<b>Maximum rotation speed</b>	48 rats/sec
<b>Regulatory Approvals</b>	<b>Switch type</b>	Light force micro-switch
	<b>Switch life</b>	1 million operations
	<b>Mechanical life</b>	Minimum 200,000 revolutions
	<b>Compliant</b>	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
	<b>Compatibility</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32* (No driver is required for this device. Native support is provided by the operating system.), xpe, ce.net, Linux, XP-64
	<b>Operating system support</b>	

\* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <http://www.windowsvista.com/upgradeadvisor>. For Windows Vista system requirements, visit <http://www.windowsvista.com/systemrequirements>.

### Technical Specifications - Input/Output Devices

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HP 2-button Optical Scroll Mouse (USB)	Dimensions (H x L x W)	1.5 x 4.5 x 2.5 inches; 3.8 x 11.6 x 6.3 cm
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 inches; 185 cm
	System requirements	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and 4

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HP Optical 3-Button Mouse (USB)	Dimensions/Weight	Height	1.5 inches; 3.76 cm
		Length	4.5 inches; 11.56 cm
		Width	2.4 inches; 6.19 cm
		Weight	3.80 oz (108 g)
	Environmental	Operating temperature	32° to 104° F (0° to 40° C)
		Non-operating temperature	-4° to 140° F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
	Mechanical	Tracking speed	6 in/s Maximum
		Switch life	3,000,000 operations
		Switch type	Micro-switches
		Tracking mechanism life	155 miles (250 km) at average speed of 10 in/s
		Cable length	9.5 feet; 2.9 m

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HP SpacePilot USB (Windows XP only)	Physical Characteristics	Dimensions (L x W x H)	9.3 x 5.6 x 2.0 inches; 236 x 143 x 53 mm
		Weight	1.875 lb (0.85 kg)
		Palmrest	Sculpted
	Mechanical	Buttons	21+ programmable speed keys 15 reprogrammable
		LCD Viewing Area	(W x H) 4.0" x 1.0" (102.4 x 30.2mm)
		Active Area	(W x H) 3.7" x 1.0" (93.4 x 26.2mm)
		Display Format	240 x 64
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	Connector	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP	
	Regulatory Approvals	FCC, CE	

### Technical Specifications - Optical Devices

HP 16X Max SATA DVD-ROM Drive (EW268AA)	<b>16X Max SATA DVD-ROM Drive</b>	5.25-inch, half-height, tray-load	
	<b>Orientation</b>	Either horizontal or vertical	
	<b>Interface type</b>	SATA/ATAPI	
	<b>Disc capacity</b>	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)	
	<b>Dimensions (W x H x D)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	<b>Weight (max)</b>	2.6 lb (1.2 kg)	
	<b>Read speeds</b>	DVD+R/-R/+RW/-RW/+R DL /-R DL DVD-ROM DVD-RAM CD-ROM, CD-R CD-RW	Up to 8X Up to 16X Up to 4X Up to 48X Up to 32X

#### Removable Storage – Media Compatibility – DVD-ROM

Media	Read	Write
CD-ROM	Yes	No
CD-R	Yes	No
CD-RW	Yes	No
DVD-ROM	Yes	No
DVD-ROM DL	Yes	No
DVD-RAM	Yes	No
DVD+R	Yes	No
DVD+R DL	Yes	No
DVD+RW	Yes	No
DVD-R	Yes	No
DVD-RW	Yes	No
DVD-R DL	Yes	No
<b>Access times</b> (typical reads, including setting)	<b>Random</b> <b>Full Stroke</b> <b>Cache Buffer</b>	DVD:< 140 ms (typical), CD:< 125 ms (typical) DVD:< 250 ms (seek), CD: < 210 ms (seek) 2 MB (minimum)
	<b>Data Transfer Modes</b>	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirement</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	<b>DC Current</b>	5 VDC -<1000 mA typical,<1600 mA maximum 12 VDC -<600 mA typical,<1400 mA maximum

### Technical Specifications - Optical Devices

<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating) 41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b> 10% to 90% (operating)
	<b>Maximum Wet Bulb</b> 86° F (30° C)
	<b>Temperature</b> (operating)
<b>Operating systems supported</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system.
	* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a> . For Windows Vista system requirements, visit <a href="http://www.windowsvista.com/systemrequirements">http://www.windowsvista.com/systemrequirements</a> .
<b>Option kit contents</b>	HP 16X Max SATA DVD-ROM Drive, Intervideo WinDVD and installation guide.

<b>HP 16X Max SATA DVD- ROM Drive (EW268AA)</b>	<b>16X Max SATA DVD- ROM Drive</b>	5.25-inch, half-height, tray-load
	<b>Orientation</b>	Either horizontal or vertical
	<b>Interface type</b>	SATA/ATAPI
	<b>Disc capacity</b>	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)
	<b>Dimensions (W x H x D)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	<b>Weight (max)</b>	2.6 lb (1.2 kg)
	<b>Read speeds</b>	DVD+R/-R/+RW/-RW/+R DL /-R DL DVD-ROM Up to 16X DVD-RAM Up to 4X CD-ROM, CD-R Up to 48X CD-RW Up to 32X

### Removable Storage – Media Compatibility – DVD-ROM

<b>Media</b>	<b>Read</b>	<b>Write</b>
CD-ROM	Yes	No
CD-R	Yes	No
CD-RW	Yes	No
DVD-ROM	Yes	No
DVD-ROM DL	Yes	No
DVD-RAM	Yes	No
DVD+R	Yes	No
DVD+R DL	Yes	No
DVD+RW	Yes	No
DVD-R	Yes	No
DVD-RW	Yes	No



### Technical Specifications - Optical Devices

DVD-R DL	Yes	No
<b>Access times</b> (typical reads, including setting)	<b>Random</b> <b>Full Stroke</b> <b>Cache Buffer</b>	DVD:< 140 ms (typical), CD:< 125 ms (typical) DVD:< 250 ms (seek), CD: < 210 ms (seek) 2 MB (minimum)
	<b>Data Transfer Modes</b>	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirement</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	<b>DC Current</b>	5 VDC -<1000 mA typical,<1600 mA maximum 12 VDC -<600 mA typical,<1400 mA maximum
<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating)	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b> (operating)	10% to 90%
	<b>Maximum Wet Bulb</b>	86° F (30° C)
	<b>Temperature</b> (operating)	
<b>Operating systems supported</b>	Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. No driver is required for this device. Native support is provided by the operating system.	
	* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a> . For Windows Vista system requirements, visit <a href="http://www.windowsvista.com/systemrequirements">http://www.windowsvista.com/systemrequirements</a> .	
<b>Option kit contents</b>	HP 16X Max SATA DVD-ROM Drive, Intervideo WinDVD and installation guide.	

HP 16X Max SATA DVD+/-RW LightScribe Drive	<b>Form Factor</b>	5.25-inch, half-height, tray-load
	<b>Orientation</b>	Either horizontal or vertical
	<b>Interface type</b>	SATA/ATAPI
	<b>Disc capacity</b>	8.5 GB DL or 4.7 GB standard
	<b>Dimensions (W x H x D)</b>	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)
	<b>Weight (max)</b>	2.6 lb (1.2 kg)
	<b>Write speed</b>	DVD+R Up to 16X DVD+RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 4X DVD-R Up to 16X DVD-RW Up to 6X DVD-RAM Up to 12X CD-R Up to 48X



### Technical Specifications - Optical Devices

<b>Read speeds</b>	CD-RW	Up to 32X
	DVD-RAM	Up to 12X
	DVD+RW, DVD-RW, DVD+R DL, DVD-R DL	Up to 8X
	DVD-ROM, DVD+R, DVD-R	Up to 16X
	CD-ROM, CD-R	Up to 48X
	CD-RW	Up to 32X
<b>Access times</b> (typical reads, including setting)	<b>Random</b>	DVD: < 130 ms (typical), CD: < 120 ms (typical)
	<b>Full Stroke</b>	DVD: < 240 ms (seek), CD: < 200 ms (seek)
<b>Power</b>	<b>Source</b>	SATA DC power receptacle
	<b>DC Power Requirement</b>	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	<b>DC Current</b>	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC - < 600 mA typical, < 1400 mA maximum
	<b>Total Drive Power</b> (standby mode)	< 2.5 Watt
<b>Environmental</b> (all conditions non-condensing)	<b>Temperature</b> (operating)	41° to 122° F (5° to 50° C)
	<b>Relative Humidity</b> (operating)	10% to 90%
	<b>Maximum Wet Bulb</b>	86° F (30° C)
	<b>Temperature</b> (operating)	
<b>Operating Systems Supported</b>	Windows Vista Business 64* (64-bit expected availability in July 2007), Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*, Red Hat Linux WS 4, 32/64-bit OS. No driver is required for this device. Native support is provided by the operating system.	
<b>Option kit contents</b>	<p>* Certain Windows Vista product features require advanced or additional hardware. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit <a href="http://www.windowsvista.com/upgradeadvisor">http://www.windowsvista.com/upgradeadvisor</a>. For Windows Vista system requirements, visit <a href="http://www.windowsvista.com/systemrequirements">http://www.windowsvista.com/systemrequirements</a>.</p> <p>HP 16X DVD+-RW SuperMulti LightScribe drive, LightScribe software, Roxio Easy Media Creator version 9, Intervideo WinDVD Software, installation guide, and DVD+R media. Software is Microsoft Windows only.</p>	

### Technical Specifications - Graphics

NVIDIA Quadro NVS 285, 128 MB PCIe - Dual Head (RD069AA)	<b>Form Factor</b>	Low profile, both ATX and low profile brackets included
	<b>Graphics Controller</b>	Integrated Quadro 285 2D graphics processor unit (GPU)
	<b>Bus Type</b>	PCIe
	<b>RAMDAC</b>	Dual 350 MHz (integrated)
	<b>Memory</b>	128 MB DDR
	<b>Connector</b>	DVI DMS-59 to dual DVI Y-cable and DMS-59 to dual-VGA Y-cable
	<b>Dimensions</b>	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	<b>Controller clock speed</b>	250 MHz
	<b>Color depth</b>	32 bits/pixel max
	<b>Overlay planes</b>	One 16-bit Video overlay plane
	<b>Maximum pixel clock</b>	350 MHz
	<b>Multi-monitor support</b>	Dual analog or digital monitors
	<b>Single DVI Support</b>	Yes
	<b>Dual DVI Support</b>	Yes
	<b>High-definition Video Processor (HDVP)</b>	Full screen, full frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
	<b>Available graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://www.hp.com/country/us/en/support.html?pageDisplay=drivers">http://www.hp.com/country/us/en/support.html?pageDisplay=drivers</a>

NVIDIA Quadro NVS 290, 256 MB Dual Head	<b>Form Factor</b>	Low Profile
	<b>Bus Type</b>	PCIe x16
	<b>Memory</b>	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connector</b>	DMS-59, includes DMS-59 to Dual DVI-I cable. DMS-59 to Dual VGA cable available as an option.
	<b>Display resolution support</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	<b>RAMDAC</b>	Integrated dual 400MHz
	<b>Color planes</b>	32-bit color buffer
	<b>Overlay planes</b>	Hardware supported
	<b>nView architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.
	<b>Multi-Monitor support</b>	Dual monitor support

### Technical Specifications - Graphics

<b>DVI support</b>	DMS-59 (to dual DVI-SL)
<b>High-definition Video Processor (HDVP)</b>	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
<b>Supported graphics APIs</b>	OGL 2.1 & DX10 Support; Shader Model 4.0
<b>Available graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode ), Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

<b>NVIDIA Quadro FX 560 PCIe graphics controller (ES354AA)</b>	<b>Form Factor</b> ATX
	<b>Graphics Controller</b> NVIDIA NV73GL
	<b>Bus Type</b> PCI Express x16
	<b>Memory</b> 128MB 600MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b> 2 DVI-I (one dual-link) + 9-pin HDTV output
	<b>Display resolution support</b> Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	<b>RAMDAC</b> Dual 400MHz integrated
	<b>Architecture features</b> 128-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo

### Technical Specifications - Graphics

<b>Shading architecture</b>	Fully programmable GPU Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>Supported graphics APIs</b>	OpenGL 2.0 DirectX 9.0
<b>Available graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

<b>NVIDIA Quadro FX 570</b>	<b>Form Factor</b>	ATX
<b>PCI-Express graphics controller</b>	<b>Bus Type</b>	PCI-Express x16
	<b>Memory</b>	256 MB 400MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	<b>Connectors</b>	DVI-I (dual-link) and DVI-I (dual-link)
	<b>Display resolution support</b>	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	<b>RAMDAC</b>	Integrated dual 400MHz
	<b>Architecture features</b>	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	<b>Power consumption</b>	<60 W
	<b>Shading architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	<b>Supported graphics APIs</b>	OpenGL 2.1 & SM4.0 and DirectX10 Support
	<b>Available graphics drivers</b>	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

### Technical Specifications - Graphics

NVIDIA Quadro FX 1500	Form Factor	ATX
PCIe graphics controller (ES355AA)	Graphics Controller	NVIDIA NV71GL
	Bus Type	PCI Express x16
	Memory	256MB GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 9-pin HDTV output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). HD-Out component Mode: YPrPB - SMPTE 1080i, 720p, 480p, 576p or composite Mode: NTSC/PAL 480i, 576i NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated
	Architecture features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz)
	Shading architecture	Fully programmable GPU Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	Available graphics drivers	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

### Technical Specifications - Graphics

NVIDIA Quadro FX 1700	Form Factor	ATX
PCI-Express graphics controller	Bus Type	PCI Express x16
	Memory	512 MB 400 MHz DDR2 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	DVI-I (dual-link) and DVI-I (dual-link) and HD-out
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Integrated dual 400MHz
	Architecture features	High Resolution Anti-Aliasing PureVideo 2 engine supports AES 128-bit decryption GPU Computing (HW/SW including CUDA SDK 3D Textures LightSpeed Memory Architecture II 128-bit color precision Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes H/W accelerated pixel readback 3rd generation occlusion culling AA on scan-out
	Power consumption	<75 W
	Shading architecture	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Vertex/Pixel Shader 4.0 Shading Support (HLSL, GLSL, CgFX)
	Supported graphics APIs	OpenGL 2.1 & SM4.0 and DirectX10 Support
	Available graphics drivers	Microsoft Windows Vista 32 and 64, Microsoft Windows XP, Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .

NVIDIA Quadro FX 3500	Form Factor	ATX
PCIe graphics controller (ES357AA)	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI-Express x16
	Memory	256MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®

### Technical Specifications - Graphics

<b>Maximum Resolution</b>	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each
<b>RAMDAC</b>	Dual 400MHz integrated
<b>Architecture Features</b>	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz) SLI Link
<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>Supported Graphics APIs</b>	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
<b>Available Graphics Drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .
<b>Maximum Resolution</b>	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each

### Technical Specifications - Graphics

NVIDIA Quadro FX 3700	Form Factor	ATX
PCI-Express 2.0 graphics board (KD506AA)	Graphics Controller	NVIDIA NV71GL-U
	Bus Type	PCI Express x16
	Memory	512MB 700MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 2560x1600 @ 60Hz. NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft® Windows®
	RAMDAC	Dual 400MHz integrated
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 32x FSAA dramatically reduces visual aliasing artifacts at resolution up to 1920x1200 Hardware accelerated anti-aliased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 2560x1600 @ 60Hz SLI Link
	Shading Architecture	Fully programmable GPU (OpenGL 2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported Graphics APIs	OpenGL 2.1 DirectX 10.0
	Available Graphics Drivers	Genuine Windows Vista Business (64-bit and 32-bit) Microsoft Windows XP Professional (64-bit and 32-bit) Qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a> .
	Maximum Resolution	Dual DVI-I output – drives dual digital displays at resolutions up to 2560x1600 @ 60Hz Internal 400MHz RAMDACs – drives dual analog displays up to 2048x1536 @ 85Hz each

NVIDIA Quadro FX 4500 PCIe, 512 MB (EA762AA)

Graphics controller  
Bus Type  
RAMDAC

NVIDIA Quadro FX 4500 Workstation GPU  
PCI Express x16  
Dual 400 MHz integrated

### Technical Specifications - Graphics

<b>Memory</b>	512 MB GDDR3 SDRAM unified graphics memory
<b>Connectors</b>	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
<b>Display resolution support</b>	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays
<b>NVIDIA Quadro FX 4500 architecture</b>	256-bit memory interface 35.2GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision 65,536 fragment instruction 65,536 vertex instruction 3D volumetric textures Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes Hardware two-sided lighting 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back
<b>Shading Architecture</b>	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>High Level Shader Languages</b>	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
<b>High-Resolution Antialiasing</b>	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
<b>Display Resolution Support</b>	Dual Dual Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
<b>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
<b>Supported Graphics APIs</b>	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c

### Technical Specifications - Graphics

<b>Available Graphics drivers</b>		Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>
<b>NVIDIA Quadro FX 4600 (768 MB)</b>	<b>Graphics controller</b>	NVIDIA Quadro FX 4600 Workstation GPU
	<b>Bus Type</b>	PCI Express x16
	<b>RAMDAC</b>	Dual 400 MHz integrated
	<b>Memory</b>	768 MB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	<b>Multi-monitor Support</b>	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays
<b>NVIDIA Quadro FX 4600</b>	<b>384-bit memory interface</b>	
	<b>Architecture</b>	67.2 GB/sec. memory bandwidth
		Full 128-bit floating point color precision
		12-bit subpixel precision
		65,536 fragment instruction
		65,536 vertex instruction
		3D volumetric textures
		Single-system powerwall
		Hardware accelerated antialiased points & lines
		Hardware OpenGL® overlay planes
		Hardware accelerated two-sided lighting
		Hardware accelerated clipping planes
		Hardware two-sided lighting
		3rd-generation occlusion culling
		OpenGL quad-buffered stereo
		Hardware-Accelerated Pixel Read-Back
<b>Shading Architecture</b>	<b>16 textures per pixel in fragment programs</b>	
	<b>Window ID clipping functionality</b>	
	<b>Hardware accelerated line stippling</b>	
	<b>Fully programmable GPU (OpenGL2.0/DirectX 9.0c class)</b>	
	<b>Long fragment programs (up to 65,536 instructions)</b>	
	<b>Long vertex programs (up to 65,536 instructions)</b>	
	<b>Looping and subroutines (up to 256 loops per vertex program)</b>	
	<b>Dynamic flow control</b>	
	<b>Conditional execution</b>	
<b>High-level Shader Languages</b>	<b>Optimized compiler for Cg and Microsoft® HLSL</b>	
	<b>OpenGL 2.0 and DirectX 9.0c support</b>	
	<b>Open source compiler</b>	
<b>High-resolution Antialiasing</b>	<b>12-bit subpixel sampling precision enhances AA quality</b>	
	<b>Rotated-grid full-scene antialiasing (RG FSAA)</b>	
	<b>16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200</b>	

### Technical Specifications - Graphics

<b>Display Resolution Support</b>	Dual dual-link DVI-I outputs drive two digital displays at resolutions up to 2560 x 1600 @ 60Hz Internal 400 MHz DACs – Two analog displays up to 2560x1600 @ 60 Hz
<b>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
<b>Supported Graphics APIs</b>	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
<b>Available Graphics drivers</b>	Microsoft Windows XP Professional, Microsoft Windows Vista Professional, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>

<b>NVIDIA Quadro FX 5500 Graphics controller</b>	NVIDIA Quadro FX 5500 Workstation GPU
<b>PCIe Graphics (RF089AA)</b>	
<b>Bus Type</b>	PCI Express x16
<b>RAMDAC</b>	Dual 400 MHz integrated
<b>Memory</b>	1 GB GDDR2 SDRAM unified graphics memory
<b>Connectors</b>	2 Dual-link DVI-I, 1 Stereo
<b>Multi-monitor support</b>	Yes
<b>NVIDIA Quadro FX 5500 Architecture</b>	256-bit memory interface 33.6 GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric textures support Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Line Strippling 16 textures per pixel in fragment programs Window ID clipping functionality
<b>Shading Architecture</b>	Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>High Level Shader Languages</b>	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler

### Technical Specifications - Graphics

<b>High-Resolution Antialiasing</b>	12-bit subpixel sampling precision enhances AA quality Rotated Grid Full Scene Antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
<b>Display Resolution Support</b>	2 Dual-link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 24Hz Internal 400 MHz DACs - Two analog displays up to 2048x1536 @ 75 Hz each
<b>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft® Windows®.
<b>Supported Graphics APIs</b>	OpenGL 2.0 DirectX 9.0c
<b>3D Primitive Perf</b>	Geometry (Triangles per Second) 225 Million Fill Rate (Texels per Second) 15.6 Billion
<b>Available Graphics drivers</b>	Microsoft Windows Vista Business 32 and 64, Microsoft Windows XP Professional, Windows XP Professional x64 Edition, Linux® - Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>

<b>NVIDIA Quadro FX 5600</b>	<b>Graphics controller</b>	NVIDIA Quadro FX 5600 graphics board
PCIe graphics board (GU095AA)	<b>Bus Type</b>	PCI Express x16
	<b>RAMDAC</b>	Dual 400 MHz integrated
	<b>Memory</b>	1.5 GB GDDR3 SDRAM unified graphics memory
	<b>Connectors</b>	2 Dual-Link DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output
	<b>Multi-monitor support</b>	Dual integrated display controllers supporting up to 2560x1600 @ 60Hz (both analog and digital) on both displays
<b>NVIDIA Quadro FX 5600</b>	<b>Architecture</b>	128-bit color precision Unlimited fragment instruction Unlimited vertex instruction 3D volumetric texture support Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd-generation occlusion culling 16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling

### Technical Specifications - Graphics

<b>Shading Architecture</b>	Fully programmable GPU (OpenGL 2.1/DirectX 10 class) Long fragment programs (unlimited instructions) Long vertex programs (unlimited instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
<b>High Level Shader Languages</b>	Optimized compiler for Cg and Microsoft® HLSL OpenGL 2.1 and DirectX 10 support Open source compiler
<b>High-Resolution Antialiasing</b>	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 32x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920x1200
<b>Display Resolution Support</b>	Dual dual-link DVI-I outputs support two digital displays at up to 2560x1600 @ 60Hz Internal 400 MHz DACs – Two analog displays up to 2560x1600 @ 60Hz
<b>nView Architecture</b>	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows®.
<b>Supported Graphics APIs</b>	OpenGL 2.1 ICD with immediate mode support for all OGL primitive types DirectX 10
<b>Available Graphics Drivers</b>	Microsoft Windows XP Professional, Genuine Windows Vista Professional, Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: <a href="http://welcome.hp.com/country/us/eng/software_drivers.html">http://welcome.hp.com/country/us/eng/software_drivers.html</a>

### Technical Specifications - Monitors

#### HP L1965 19-inch LCD Monitor

Panel	Type	Active matrix, thin film transistor (TFT)
	Viewable Image Area (diagonal)	19 inches; 48.25 cm maximum viewable
	Screen Opening (WxH)	14.9 x 12.0 inches; 38.0 x 30.5 cm
	Viewing Angle (typical)	178 degrees horizontal/178 degrees vertical (10:1 minimum contrast ratio)
	Brightness (typical)	300 nits (cd/m <sup>2</sup> )
	Contrast Ratio (typical)	1000:1 (typical)
	Response Rate (typical)	6 ms (typical gray to gray)**
	Pixel Pitch	0.294 mm
	Backlight Lamp Life (to half brightness)	50K hours
Video/Other Inputs	Plug and Play	Yes (supports VESA DDC2B and DDC/CI; PC2001 compliant)
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
	Input Signal	Two DVI-I connectors (VGA analog or digital)
	Input Impedance	75 ohms ± 2%
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)
	Video Cable	One DVI-D to DVI-D, and 1 DVI-I to VGA cables
	Video Cable Length	71 in (1.8 m)
Signal Interface/Performance	Horizontal Frequency	24 to 83 kHz
	Vertical Frequency	48 to 76 Hz
	Native Resolution	1280 x 1024 @ 75 Hz analog 1280 x 1024 @ 60 Hz digital
	Maximum Resolution (Analog)	1280 x 1024 @ 75 Hz analog
	Maximum Resolution (Digital)	1280 x 1024 @ 75 Hz analog
	Preset VESA Graphic Modes (non-interlaced)	640 x 480 @ 60 Hz, 72 Hz, 75 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz, 72 Hz, 75 Hz 1024 x 768 @ 60 Hz, 70 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz
	Preset MAC Mode	832 x 624 @ 75 Hz 1152 x 870 @ 75 Hz
	Preset VGA Mode	640 x 480 @ 60 Hz, 72 Hz
	Preset SUN Mode	1152 x 900 @ 76 Hz

### Technical Specifications - Monitors

	<b>Fail Safe Mode</b>	Yes (limits out of range signal messages)
	<b>Maximum Pixel Clock Speed</b>	140 MHz
	<b>User Programmable Modes</b>	Yes, 15
	<b>Anti-Glare</b>	Yes
	<b>Anti-Static</b>	Yes
	<b>AssetControl</b>	Yes (accessible on HP Compaq Business Desktops featuring Intelligent Manageability)
	<b>Default Color Temperature</b>	Yes (6500k, 9300k, SRGB, Custom User)
<b>On Screen Display (OSD) Controls</b>	<b>Buttons or Switches</b>	Power on/off; 3-button OSD; second level OSD buttons include dual-input switch, dedicated auto adjust switch
	<b>Languages</b>	English, Spanish, French, German, Netherlands, Italian, Japanese, Simplified Chinese
	<b>User Controls</b>	Size and Positioning Contrast Brightness Clock, Clock Phase Selectable Color Temperature Serial Number Mode Displayed Sleep Timer Input Selection Factory Reset
<b>Power</b>	<b>Power Supply</b>	Auto-ranging, 90 to 265 VAC; internal power supply
	<b>Input Power</b>	100 ~ 240 VAC
	<b>Nominal Current</b>	1.5 A maximum
	<b>Frequency</b>	50 ~ 60 Hz
	<b>Typical Power Consumption</b>	< 35 watts
	<b>Maximum</b>	< 55 watts
	<b>Power Saving</b>	< 2 watts
	<b>Off Mode</b>	0 watts (when master power switch is in the off position)
	<b>Power Cable Length</b>	74.8 in (1.9 m); non-captive
<b>Mechanical</b>	<b>Dimensions (H x W x D)</b>	<b>Unpacked with stand</b> 14.85 min to 18.79 max x 15.9 x 8.78 inches (37.72 min to 47.72 max x 40.39 x 22.29 cm) <b>Base Area</b> 8.78 x 11.88 inches (Footprint D x W) (22.29 x 30.18 cm) <b>Panel only (without stand)</b> (H x 12.96 x 15.9 x 2.4 inches W x D) (32.91 x 40.39 x 6.1 cm)

### Technical Specifications - Monitors

Environmental	Weight	Unpacked with stand	15.6 lbs (7.06 kg)
	Unpacked without stand	9.26 lbs (4.19 kg)	
	Packaged	20.5 lbs (9.27 kg)	
	Bezel Width	12.5 mm left and right, 12.75 mm top and bottom	
	Tilt Range	-4 degrees to +30 degrees	
	Swivel Range	± 45 degrees horizontal swivel	
	Height Adjustable	Yes (4 in/100mm adjustment range)	
	Pivot Rotation	Yes, 90 degrees	
	Base	Ships attached and is removable	
	Temperature – Operating	41° to 95° F (5° to 35° C)	
Environmental Data	Temperature – Non-operating	-4° to 140° F (-20° to 60° C)	
	Humidity – Operating	20% to 80%	
	Humidity – Non-operating	5% to 95%	
	Altitude – Operating	0 to 12,000 ft (0 to 3,658 m)	
Environmental Data	Altitude – Non-operating	0 to 40,000 ft (0 to 12,192 m)	
	Eco-Label Certifications and Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:	
		<ul style="list-style-type: none"> <li>• US Energy Star</li> <li>• CECP</li> </ul>	

Energy Consumption (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
Normal Operation	35.7 watts	35.6 watts	35.1 watts
Sleep	1.08 watts	1.14 watts	1.23 watts
Off	0.93 watts	0.94 watts	0.92 watts
<b>Heat Dissipation*</b>	100 VAC, 50 Hz	115 VAC, 60 Hz	230 VAC, 50 Hz
Normal Operation	121.7 BTU/hr	121.4 BTU/hr	119.7 BTU/hr
Sleep	3.68 BTU/hr	3.89 BTU/hr	4.19 BTU/hr
Off	3.17 BTU/hr	3.21 BTU/hr	3.14 BTU/hr

**\*NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Longevity and Upgrading	Upgradeability features contained in the product include: One upstream and four downstream USB ports
Ergonomics	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.
Additional Information	This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.

### Technical Specifications - Monitors

This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 100% recycled materials (by wt.)

This product is 100% recyclable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated - 0.955 kg
- Plastic (other) - 0.055 kg
- Polystyrene - 0.24 kg

#### Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at [http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances



### Technical Specifications - Monitors

	<b>Packaging</b>	<ul style="list-style-type: none"><li>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)</li></ul> <p>HP follows these guidelines to decrease the environmental impact of product packaging:</p> <ul style="list-style-type: none"><li>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.</li><li>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.</li><li>• Design packaging materials for ease of disassembly.</li><li>• Maximize the use of post-consumer recycled content materials in packaging materials.</li><li>• Use readily recyclable packaging materials such as paper and corrugated materials.</li><li>• Reduce size and weight of packages to improve transportation fuel efficiency.</li><li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.</li></ul>
	<b>End-of-life Management and Recycling</b>	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
	<b>Hewlett-Packard Corporate Environmental Information</b>	<p>For more information about HP's commitment to the environment:</p> <p>Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a></p> <p>Eco-label certifications <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a></p> <p>ISO 14001 certificates: <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a></p>
<b>Options</b>	<b>HP Silver Flat Panel Speaker Bar</b>	Powered directly by the monitor or PC, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately, part number EE418AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.
<b>Other</b>	<b>Accessories Included</b>	One DVI-D to DVI-D cable, one DVI-I to VGA cable, one USB cable, and CD-ROM with Pivot Pro software, HP Display Assistant software, and HP Display LiteSaver software.
	<b>Software</b>	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or

### Technical Specifications - Monitors

	keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
<b>User Guide Languages</b>	English, Bahasa, B. Portuguese, French, LA Spanish, Korean, Simplified Chinese, Traditional Chinese, Japanese, Danish, Dutch, Finnish, German, Italian, Norwegian, Swedish, Greek, Polish, Russian, Slovenian, Turkish
<b>Warranty Languages</b>	English
<b>Color</b>	Carbonite, two-tone carbonite and silver (EMEA only)
<b>VESA Mounting</b>	Yes (swing arm/wall mount not included); base must be removed for mounting options
<b>VESA External Mounting</b>	Yes (standard 4 hole pattern, 100 mm)
<b>Kensington Lock-ready</b>	Yes
<b>Certification and Compliance</b>	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 13406-2 Compliant (Pixel Defect Guidelines), Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 or 03 depending on region (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft® Windows® Certification
<b>Compatibility</b>	VESA Video Signal Standard (VSIS) Compliant video cards have been tested and proven compatible for use with the HP LP1965 Flat Panel Monitor. Recommended for use with HP products.
<b>Service and Warranty</b>	Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

### HP LP2065 20-inch LCD Panel Monitor

Type	20-inch Active Matrix TFT (thin film transistor)
Viewable Image Area (diagonal)	20.1 inches; 51 cm
Screen Opening (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm



### Technical Specifications - Monitors

<b>On Screen Display (OSD) Controls</b>	<b>Viewing Angle (typical)*</b>	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)
	<b>Brightness (typical)*</b>	Up to 300 nits (cd/m <sup>2</sup> )
	<b>Contrast Ratio (typical)*</b>	Up to 800:1
	<b>Response Rate (typical)*</b>	8 ms (gray to gray), 16 ms (rise + fall)
	<b>Pixel Pitch</b>	0.255 mm
	<b>Backlight Lamp Life (to half brightness)</b>	45K hours
	<b>Buttons or Switches</b>	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
	<b>Languages</b>	English, French, German, Spanish, Italian, Dutch, and Japanese
	<b>User Controls</b>	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection, image control (including scaling), and factory reset
	<b>Horizontal Frequency</b>	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
<b>Signal Interface/Performance</b>	<b>Vertical Frequency</b>	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	<b>Native Resolution</b>	1600 x 1200 @ 60 Hz (recommended)
	<b>Preset VESA Graphic Modes (non-interlaced)</b>	1600 x 1200 @ 60 Hz, 75 Hz (VGA input) 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 85 Hz 640 x 480 @ 60 Hz, 75 Hz, 85 Hz
	<b>Text Mode</b>	720 x 400 @ 70 Hz
	<b>Mac Mode</b>	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	<b>Sun Mode</b>	1152 x 900 @ 66 Hz
	<b>Maximum Pixel Clock Speed</b>	202 MHz (VGA input); 162 MHz (DVI input)
	<b>User Programmable Modes</b>	Yes, 10
	<b>Anti-Glare</b>	Yes
	<b>Anti-Static</b>	Yes
<b>Video Input</b>	<b>Default Color Temperature</b>	6500 K
	<b>Plug and Play</b>	Yes

### Technical Specifications - Monitors

	<b>Input Signal</b>	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video
	<b>Self Powered USB 2.0 Hub</b>	One upstream, four downstream ports (cable included)
	<b>Input Signal</b>	Two DVI-I connectors (dual VGA analog or dual digital input possible)
	<b>Input Impedance</b>	75 ohms $\pm$ 10%
	<b>Sync Input</b>	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	<b>Video Cable</b>	Two VGA to DVI-I; two DVI-D to DVI-I
	<b>Video Cable Length</b>	5.9 feet; 1.8 m
<b>Power</b>	<b>Input Power</b>	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	<b>Frequency</b>	47.5 to 63 Hz
	<b>Typical Power Consumption</b>	55 watts (without USB ports); 70 watts (USB ports fully loaded)
	<b>Maximum</b>	< 75 W
	<b>Power Saving</b>	< 2 watts
	<b>Power Cable Length</b>	5.9 feet; 1.8 m
<b>Mechanical</b>	<b>Dimensions (H x W x D)</b>	Unpacked with stand: 16.7 to 21.8 x 17.4 x 8.67 in 42.5 to 55.5 x 44.3 x 22.0 cm  Unpacked w/o stand (head only): 13.58 x 17.4 x 3.42 in 34.5 x 44.3 x 8.7 cm  Packaged: 11.77 x 22.2 x 16.77 in 29.9 x 56.4 x 42.6 cm
	<b>Weight</b>	Unpacked: With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)  Packaged: 26.3 lb (11.95 kg)
	<b>Tilt Range</b>	-5° to + 25° vertical tilt
	<b>Swivel Range</b>	-45° to + 45°
	<b>Height Adjustable</b>	Yes, range 5.1 inches; 13.0 cm
	<b>Pivot Rotation</b>	Yes
	<b>Base</b>	Detachable, ships attached
<b>Environmental</b>	<b>Temperature – Operating</b>	46° to 95° F (10° to 35° C)
	<b>Temperature – Non-operating</b>	6° to 140° F (-10° to 60° C)
	<b>Humidity – Operating</b>	20% to 80% non-condensing
	<b>Humidity – Non-operating</b>	5% to 85%

### Technical Specifications - Monitors

Options	Altitude – Operating	+12,000 feet; +3,657.6 m
	Altitude – Non-operating	+40,000 feet; +12,192 m
Other	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or the PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately. For more information, refer to the HP Silver Flat Panel Speaker Bar QuickSpec.
User Guide Languages	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #1 or 2 (DVI-I analog) connector.
Software	DVI-D to DVI-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #1 or #2 (DVI-I digital) connector.	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
User Guide Languages	HP Display Assistant Utility	makes it possible to adjust displays settings through the PC using two-way communication via DDCI.
Warranty Languages	HP Display Lite Saver	allows ability to power up and down display at predetermined hours of the day to save power and backlight life.
Color	Pivot Pro	software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
Certification and Compliance	User Guide Languages	English
Compatibility	Warranty Languages	English
Certification and Compliance	Color	Carbonite/Silver
Compatibility	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
Certification and Compliance	Kensington Lock-Ready	Yes
Compatibility	Canadian Requirements/CSA, CE Marking, CISPR Requirements, , Energy Star 3.0 Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval,, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)	Canadian Requirements/CSA, CE Marking, CISPR Requirements, , Energy Star 3.0 Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval,, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
Certification and Compliance	Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.

### Technical Specifications - Monitors

#### Service and Warranty

Three years parts, labor, and on-site service. 24-hour 365-day 1-800 technical support. Replacement options include 2nd business day on-site service or next business day direct replacement. With direct replacement, HP will ship a replacement display product directly to you. Using the shipping labels provided, return your failed display to HP. Certain restrictions and exclusions apply. For details, contact HP Customer Support.

HP LP2465 24-inch Widescreen LCD Monitor	Panel	Type	24-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	24 inches; 60.96 cm
		Screen Opening (W x H)	20.47 x 12.83 inches; 52.0 x 32.6 cm
		Viewing Angle (typical)*	178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	500 nits (cd/m <sup>2</sup> )
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	8 ms (typical gray to gray)
		Pixel Pitch	0.270 mm
		Backlight Lamp Life (to half brightness)	50K hours
		*Response time 13 ms rise and fall, 6 ms gray to gray.	
	On Screen Display (OSD) Controls	Buttons or Switches	Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
		Languages	English, French, German, Spanish, Italian, Japanese, Dutch
		User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset
	Signal Interface/ Performance	Horizontal Frequency	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
		Vertical Frequency	48 to 85 Hz (VGA and DVI input)
		Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
		Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
		Text Mode	720 x 400 @ 70 Hz
		Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz

### Technical Specifications - Monitors

	<b>Sun Mode</b>	1152 x 900 @ 66 Hz
	<b>Maximum Pixel Clock Speed</b>	202 MHz (VGA input); 162 MHz (DVI input)
	<b>User Programmable Modes</b>	Yes, 20
	<b>Anti-Glare</b>	Yes
	<b>Anti-Static</b>	Yes
	<b>Default Color Temperature</b>	6500 K
Video/Other Inputs	<b>Plug and Play</b>	Yes
	<b>Self Powered USB 2.0 Hub</b>	One upstream, four downstream ports (located on side of monitor, cable included)
	<b>Input Signal</b>	Two DVI-I (VGA analog and digital) inputs
	<b>Input Impedance</b>	75 ohms $\pm$ 10%
	<b>Sync Input</b>	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	<b>Video Cable</b>	VGA to DVI-I; DVI-D to DVI-D
Power	<b>Video Cable Length</b>	5.9 feet; 1.8 m
	<b>Input Power</b>	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	<b>Frequency</b>	47.5 to 63 Hz
	<b>Typical Power Consumption</b>	75 watts
	<b>Maximum</b>	< 110 watts
	<b>Power Saving</b>	< 2 watts
Mechanical	<b>Power Cable Length</b>	6.2 feet; 1.9 m
	<b>Dimensions (H x W x D)</b>	<b>Unpacked w/ stand</b> 14.6 (min) to 19.7 (max) x 22 x 9.1 in 37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm
		<b>Unpacked w/o stand</b> 14.4 x 22 x 3.7 in 36.6 x 55.84 x 9.2 cm
		<b>Packaged</b> 11.7 x 22.1 x 25.6 in 29.8 x 56.0 x 65.1 cm
	<b>Weight</b>	<b>Unpacked</b> 23.6 lbs (10.7 kg) <b>Packaged</b> 23.6 lbs (10.7 kg)
		23.6 lbs (10.7 kg)
Environmental	<b>Tilt Range</b>	-5° to + 25° vertical
	<b>Swivel Range</b>	-45° to + 45°
	<b>Height Adjustable</b>	Yes, range 5.1 inches; 130 mm
	<b>Pivot Rotation</b>	Yes
	<b>Base</b>	Detachable, ships detached
	<b>Temperature – Operating</b>	46° to 95° F (10° to 35° C)

### Technical Specifications - Monitors

Other	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing
	Humidity – Non-operating	5% to 85%
	Altitude – Operating	+12,000 feet; +3,657.6 m
	Altitude – Non-operating	+40,000 feet; +12,192 m
	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector
Software	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	Software	HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC.
	Software	HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
User Guide Languages	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
Options	Color	Carbonite/silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select

### Technical Specifications - Monitors

<b>Certification and Compliance</b>	HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
<b>Compatibility</b>	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star 3.0 Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)
<b>Service and Warranty</b>	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
	Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

<b>HP LP3065 30-inch Widescreen LCD Monitor</b>	<b>Panel</b>	<b>Type</b>	30.0-inch Wide Format Active Matrix TFT (thin film transistor)
		<b>Viewable Image Area (diagonal)</b>	29.77 in (75.623 cm)
		<b>Screen Opening (W x H)</b>	25.3 x 15.8 in (64.3 x 40.3 cm)
		<b>Viewing Angle (typical)*</b>	Up to 178° H/ 178° V (10:1 minimum contrast ratio)
		<b>Brightness (typical)*</b>	300 nits (cd/m <sup>2</sup> )
		<b>Contrast Ratio (typical)*</b>	1000:1
		<b>Response Rate (typical)*</b>	12 ms (8 ms average gray to gray)
		<b>Pixel Pitch</b>	0.250 mm
		<b>Backlight Lamp Life (to half brightness)</b>	40K hours
		<b>Color Gamut</b>	92% of NTSC
	<b>On Screen Display (OSD) Controls</b>	<b>Buttons or Switches</b>	Input select, brightness up, brightness down, power
		<b>User Controls</b>	Brightness, input selection
	<b>Signal Interface/Performance</b>	<b>Horizontal Frequency</b>	100 KHz
		<b>Vertical Frequency</b>	60 Hz

### Technical Specifications - Monitors

	Native Resolution	2560 x 1600 @ 60 Hz (native aspect ratio of 16:10)
	Pixel Clock Speed	275 MHz
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video/Other Inputs	Plug and Play	Yes
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)
	Input Signal	Three dual-link DVI-D inputs (Windows PC and graphics card that supports DVI ports with dual-link digital bandwidth and VESA DDC standard for plug-and-play setup requires a DVI-D dual-link graphic card that supports WQXGA (2560 x 1600) resolution.)
Power	Video Cable	Two dual-link DVI cables
	Video Cable Length	5.9 ft (1.8 m)
	Input Power	Auto-Ranging, 100 to 240 VAC; internal power supply, 50 Hz/60 Hz
Mechanical	Typical Power Consumption	118 watts
	Maximum	< 176 watts
	Power Saving	< 2 watts
Environmental	Power Cable Length	5.9 ft (1.8 m)
	Dimensions (H x W x D)	Unpacked w/ stand 19.3 to 23.2 x 27.2 x 9.5in (49.0 to 59.0 x 69.2 x 24.0 cm)
		Unpacked w/o stand (head only) 17.9 x 27.2 x 3.3 in (45.5 x 69.2 x 8.4 cm)
	Packaged	22.4 x 31.1 x 14.9 in (56.8 x 79.0 x 37.8 cm)
	Weight	Unpacked 30.6 lbs (13.9 kg)
	Tilt Range	-5° to + 30° vertical
	Swivel Range	-45° to + 45°
	Height Adjustable	Yes, range 5.1 in (100 mm)
	Pivot Rotation	No
	Base	Detachable, ships detached
	Temperature – Operating	46° to 95° F (10° to 35° C)
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing

### Technical Specifications - Monitors

	<b>Humidity – Non-operating</b>	5% to 85%		
	<b>Altitude – Operating</b>	+12,000 ft		
	<b>Altitude – Non-operating</b>	+40,000 ft		
<b>Environmental Data</b>	<b>Eco-Label Certifications and Declarations</b>	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: <ul style="list-style-type: none"><li>• US Federal Energy Management Program (FEMP)</li><li>• IT Eco Declaration</li><li>• TCO 03</li><li>• Taiwan Green Mark</li><li>• CECP</li><li>• Korea Eco-label</li><li>• EPEAT - Silver</li></ul>		
	<b>Energy Consumption</b> (in accordance with US Energy Star test method)	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
	<b>Normal Operation</b>	102.8 watts	101.7 watts	100.4 watts
	<b>Sleep<sup>1</sup></b>	2 watts	2 watts	2 watts
	<b>Off</b>	0.05 watts	0.06 watts	0.25 watts
	<b>Heat Dissipation<sup>2</sup></b>	AC Input Voltage at 100 VAC +/- 5 VAC, 50 Hz +/- 3 Hz	AC Input Voltage at 115 VAC +/- 5 VAC, 60 Hz +/- 3 Hz	AC Input Voltage at 230 VAC +/- 5 VAC, 50 Hz +/- 3 Hz
	<b>Normal Operation</b>	350.8 BTU/hr	347.0 BTU/hr	342.6 BTU/hr
	<b>Sleep</b>	6.8 BTU/hr	6.8 BTU/hr	6.8 BTU/hr
	<b>Off</b>	0.2 BTU/hr	0.2 BTU/hr	0.9 BTU/hr
	<b>NOTES</b>			
	<sup>1</sup> This sleep status ignore the input sync signal check cycle when metering the model in sleep mode.			
	<sup>2</sup> Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.			
	<b>Longevity and Upgrading</b>	Upgradeability features contained in the product include: One upstream and four downstream USB ports		
	<b>Ergonomics</b>	The monitor meets the ergonomic requirement of EN-ISO 13406-2 for flat panel displays.		
	<b>Additional Information</b>	This product is in compliance with the Restrictions of Hazardous Substances (RoHS) Directive, 2002/95/EC.		
	This HP product is designed to comply with the			

### Technical Specifications - Monitors

Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC.

This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).

This product is in compliance with the IEEE 1680 (EPEAT) standard at the SILVER level, see [www.epeat.net](http://www.epeat.net).

Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Display meets the requirement for low frequency electromagnetic fields per MPR-II, TCO, and prEN50279 A/B/C.

This product contains 0% recycled materials (by wt.)

This product is 97.6% recyclable when properly disposed of at end of life.

#### Packaging Materials

- Corrugated Paper 2.19 kg
- PE-LD Bags 0.09 kg
- EPS Molded Foam 1.07 kg

#### RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

#### Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at [http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen\\_specifications.html](http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html)):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium



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- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

#### Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

#### End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

#### Hewlett-Packard Corporate Environmental

For more information about HP's commitment to the environment:



### Technical Specifications - Monitors

	Information	Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a> Eco-label certifications <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a> ISO 14001 certificates: <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a>
Other	Accessories Included	Two dual link DVI-D to DVI-D cables - connects the graphic card's DVI-D digital connector to the monitor's input (DVI-D digital) connectors; power cord
	Software	HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite
Options	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
	HP Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
Certification and Compliance		Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals.
Compatibility		Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
Service and Warranty		Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-

### Technical Specifications - Monitors

site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.

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